



509. 1-3

BOTANIC GARDENS
and
NATIONAL HERBARIUM

BOTANICAL GARDENS
and
NATIONAL HERBARIUM

THE AUSTRALIAN NATURALIST

THE JOURNAL OF THE NATURALISTS' SOCIETY
OF NEW SOUTH WALES.

Volume VI

February, 1926—February, 1927

Sydney:

Printed and Published for the Society by
The Sydney and Melbourne Publishing Co., Ltd., Sydney.

Volume VI

Supplement to "The Australian Naturalist," Vol. 8, Part 4, 1930.

AUTHOR INDEX.

	Page.
Barnett, P. E. B.—A Visit to Bellata	62
Chisholm, A. H.—The Voice of the Whip-bird . .	11
Froggatt, W. W.—Entomological Life of the Pilliga Scrub	7, 20
Life History of the Mottled-grey Click Beetle.	48
Howell, M., and Bertram B.—Excursion to Lane Cove	63
Murray, P. D. F.—Development of the Frog from the Tadpole	42
Rupp, H.—Habits of Certain Orchids	16
Ten Days on the Upper Allyn River	4, 17
Greenhood Orchids of the Paterson District.	57
Stead, D. G.—Our 1926 Nature Exhibition . . .	55
Woodhill, A. R.—Insect Scavengers on the N.W. Plains	14
Wright, G. H.—The Outdoor Nature School . . .	25

SUBJECT INDEX.

	Page.
Allyn River	4, 17
Birds at Interlaken	45
Click Beetle, Life History of the Mottled-grey . .	48
Development of the Frog	42
Editorial	1
Entomological Life of Pilliga Scrub	7, 20
Excursion to Dulwich Hill (Mr. Royce's Aquaria).	29
Excursion to Lane Cove	63
Exhibition	55
Insect Scavengers	14
Meetings	2, 24
Mosquitoes of the Sydney District	34
Nature Exhibition	55
Notes by Members	32, 62
Obituary	30
Orchids, Habits of Certain	16
Orchids of the Paterson District	57
Outdoor Nature School, The	25
Pilliga Scrub, Entomological Life	7, 20
Presentation	28
Whip Bird, The Voice of the	11

The Australian Naturalist

Vol. VI.

FEBRUARY, 1926.

Part 1.

EDITORIAL.

The present issue of *The Australian Naturalist* marks a departure from the journal as we have known it since July, 1916. This has been due to a demand by members for an improvement of the publication, both in appearance and in subject matter, and the Publication Committee offers the present number to members in the hope that the modifications introduced go some little way towards satisfying that demand.

The question of the general turnout of the journal has received careful attention, and it has been decided to adopt the simple style of stiff cover and the better paper, as used in the present issue. The size has been increased to sixteen pages, and an endeavour will be made to publish as a frontispiece in each issue a photograph of some animal or plant of special interest. It has also been decided for greater convenience of reference to make each volume consist of four parts, published quarterly, as is the case with most other scientific journals.

While appearance is a matter of some importance, the real value of a journal such as ours lies in the nature of the subject matter it contains. In the past, many fine papers have been contributed to our journal, but a number, although of undoubted interest, have dealt with matter not relating to our own Australian Natural History, or contained much philosophical dissertation wrapped round a very small quantity of observed fact. With such a unique fauna and flora as ours, this seems unnecessary, especially when there are so many important gaps in the knowledge of our animal and plant groups to be filled. It is in the study of the habits, life histories, distribution and relation to particular environmental conditions, the very province of the field naturalist, that our knowledge is most incomplete. Certain groups, more particularly among the higher vertebrates and flowering plants, have been investigated in some detail, but even in these there is still much to be

learned; how much more then is to be found out among the lowlier but equally interesting forms of life! Truly, the harvest is plenteous but the labourers are few, and it is in a sense a reflection on the field naturalists of to-day that our journal is not twice its present size.

The Australian Naturalist, therefore, can best be employed as a medium for recording original observations, and it is the duty of members to make available their knowledge through its pages. Much valuable information has been lost in the past through its possessor not thinking it suitable for inclusion in purely systematic papers; it is just such material that this journal desires to publish.

In this work the co-operation of country members is especially desirable. Such members are unable to take part in the regular work of the Society, as they can attend but few meetings during the year, but the journal offers a way in which they can play a very definite part in the work of the Society. Indeed, they are more favored than city members, because of the very varied environments to be met with in different parts of the State, and much useful work can be done by using the journal as a centre for the correlation of observations made under widely different conditions.

The Publications Committee has made certain alterations in the general turnout of the journal, which has involved increased cost of production. This can only be met by an increased circulation, and it is now the duty of members to provide the journal with material of such quality and quantity that it shall become an asset and a source of pride to the Society.

ORDINARY MEETINGS.

6th October, 1925.—The following were elected members of the Society:—Mesdames M. S. Lewis, L. A. Heyner, P. K. Buchanan, Misses M. Cadell, I. Dawson and Messrs. A. R. Woodhill, S. L. Allman, Varney Parkes and B. Bertram.

The President made a final appeal to members to assist in making the Society's exhibition, commencing on the 7th October, a success. His remarks were supplemented by Mr. A. Forster, who spoke on behalf of the wild flower section, of which he was in charge.

The business took the form of a members' Lantern Evening, and proved to be both popular and instructive. Slides representing various phases of Natural History were shown and explained by Messrs. Froggatt, Harrington, Gallard, McCarthy, White, and Dr. Mackerras.

3rd November, 1925.—Mr. L. Gallard read two short papers on the White-Gum Moth, the larvae of which bores in the stems of the white gum (*Eucalyptus*), and on a species of black thrips, infesting bottle brush (*Callistemon*).

Dr. R. J. Noble delivered a lecture, illustrated with lantern slides, on "Some Microscopic Plants of General Interest." The lecture was much appreciated by members, and, on the motion of Messrs. Gallard and Watson, Dr. Noble was accorded a hearty vote of thanks.

1st December, 1925.—Mrs. F. Houlson, Messrs. G. H. Wright, F. W. Eddes and Dr. Gordon McLeod were elected members of the Society.

The evening was devoted to exhibits by members.

Mr. W. W. Froggatt exhibited specimens of the so-called furniture beetle *Anobium punctatum*, together with wood infested by them. He gave an account of the life-history of this species, and referred to an allied species known as the death watch beetle and the superstitions associated with it.

Mr. L. Gallard exhibited specimens of Chalcid, a wasp parasitic on the egg capsules of a spider; the larvae of an unknown moth from Eucalyptus, and a series of Ichneumon wasp parasites from moth larvae.

Mr. H. R. Harrington showed microscopic slides of coal, certain features of which he described.

Mrs. Howell exhibited a number of plants, showing abnormal conditions of growth.

Mr. A. E. Watson the flowers of the common bottle brush *Callistemon lanceolata*. These were cut from plants grown by him from seed. Of eight plants he succeeded in growing, six flowered, one of which showed a variation in colour from the parental type.

Mr. T. McCarthy exhibited specimens of the cereal root beetle *Anodontonyx tetricus*, bred from white curl grubs, attacking wheat. The beetles appeared in the field in very considerable numbers during October and November, appearing in the heat of the days, between 1 and 2 p.m., and returning to the soil towards sunset.

Mr. E. H. Zeck, who has been hon. treasurer of the Society for several years, is leaving Sydney on March 3 by the *Sierra* en route to Mexico City, where he has accepted a lucrative position. The Society, by his departure, loses one of its most enthusiastic members.

TEN DAYS ON THE UPPER ALLYN RIVER.

By REV. H. M. R. RUPP.

The Allyn River, rising in the highlands of Barrington Tops, runs through the settlements of Ecclestone and Allynbrook, and, after skirting East Gresford, finally joins the Paterson at Vacy, five miles above Paterson township. In mid-October I spent ten days at Ecclestone, my chief object being to investigate the orchids of the neighbouring brushes, and incidentally to take note of the flora in general. The conditions on the whole were most unfavourable for my purpose. No rain had fallen below the mountains since August, and violent winds and unseasonable spells of heat had combined to produce the usual features of drought. Outside of the brushes and sheltered gullies, there was practically nothing to record beyond a few trees and shrubs. Even in the brushes themselves, except in the mountains, the prevailing tone was drought. Some idea of the conditions may be gained by the fact that in all my excursions the only terrestrial orchids I could find (exclusive of the brush-dwelling *Calanthe veratrifolia*) were—one starved *Diuris sulphurea*, one withered *Pterostylis longifolia*, one other *Pterostylis* withered in bud, and a few small *Caladenia carnea*.

The brushes and shaded gullies, however, provided much to keep me well employed, and in the mountain forests the drought was much less in evidence. On three of my longer excursions I had as guide and companion Mr. John Hopson, of Ecclestone, who is well-known in entomological circles, and who leaves his tracks far and wide in the form of overturned logs, indicating searchings for beetles. I am greatly indebted to Mr. Hopson, not only for his guidance and cheerful company, but for providing the horse without which I could not have undertaken some of the excursions.

The scenery of the district is very attractive, and in a normal spring must be exceedingly beautiful. During my visit it was marred by the haze of bush-fires, and the parched condition of the Ecclestone valleys under the influence of the drought. Except for one or two scenes on the Allyn River, I was unable to get photographs of any value at all.

I made several solitary excursions into the little brushes still left here and there among the Ecclestone hills. I found epiphytic orchids in abundance, though none that I was not already familiar with. *Dendrobium speciosum*, *D. gracilicaule*,

D. Fairfaxii, and *D. linguiforme* were all in evidence. This is evidently an "off" season for *D. speciosum*, for, as in the lower parts of the Paterson Valley, so here there were no signs of this year's flowers. I only saw one raceme of rock-lily flowers during the whole trip. *D. gracilicaule* and *D. linguiforme* were both blooming prolifically: *D. Fairfaxii* was nearly over. I have seen no reason to change the opinion I formed at Bulahdelah in 1923-4, that this orchid is not a mere variety of *D. teretifolium*, but an independent and well-established species. I did not see *D. teretifolium* at all in or about the Allyn Valley. *Sarcochilus olivaceus* was the most abundant species of that genus, and in these Eccleston brushes it attains dimensions I have never seen elsewhere, with racemes of up to 15 flowers. It is a very dainty orchid, well worth cultivating. The beautiful *S. falcatus* was much commoner in the Eccleston brushes than in those about Paterson, though not in the profusion I was to see higher up among the mountains. I had been disposed to challenge the propriety of including *S. montanus* under this species, because at Paterson, in addition to some distinctions in colour and form, it blooms from six to eight weeks earlier than *S. falcatus*. But in the Eccleston brushes and the highlands beyond, both occur together in bloom, and I saw intermediate forms which convinced me that Bailey was right in placing *S. montanus* as a variety only. The little *S. Hillii* was very common, apparently having a preference for *Melaleuca styphelioides*, though growing on many other trees as well. The "hosts" of epiphytic orchids suggest an interesting field of observation. The term is perhaps open to objection, since it is commonly used to denote the victims of parasites, and of course orchids are not parasites in the proper sense of the word. But bearing this in mind, I shall use "host" as a convenient term when referring to the trees on which orchids are found. Some remarks on the subject will be made towards the close of this paper. In addition to the orchids already mentioned, *Cymbidium suave* or *albuiciflorum* was in these Eccleston brushes. I cannot distinguish these two orchids when they are not in flower. *Cleisostoma tridentatum* and *C. Beckleri* were also there—the former in great abundance. *C. Beckleri* must surely be one of the smallest orchids known: one could easily put a whole plant—roots, leaves, flowering racemes and pods—into a wax match-box. Rather larger specimens occur now and then. The perfume is very strong and delicious.

My two most fruitful expeditions were made in company with Mr. Hopson. On the first of these, we rode up the valley of Massie's Creek, which joins the Allyn at Eccleston, for some miles; and then turned up the west side of the valley to the top of the range that separates it from the valley of the Paterson River. It was on this ridge that I saw the only two living terrestrial orchids observed during my trip—a miserable-looking *Diuris sulphurea* and a few small *Caladenia carnea*. After a mile or two we came to the upper end of a magnificent brush falling away towards the Paterson; and here we lunched and spent a couple of hours—Mr. Hopson's eyes being chiefly directed downward for beetles, and mine upward for orchids. I was pleased to find, coming into bloom profusely, the Dagger Orchid, *Dendrobium pugioniforme*. I had seen it elsewhere, but had never been fortunate enough to find it in flower. *Sarcochilus falcatus* was fairly plentiful, but we saw no sign of *S. olivaceus*, which seems to prefer the lower levels. Quite suddenly I came upon a *Sarcochilus* with flowers that were strange to me, though they raised memories of *S. parviflorus*, which I had not seen in bloom for many years. It was a very small plant, and I could find none with more than 3 flowers—the majority had one only. The sepals and petals were in some cases dark brownish-green, in others just pale-green: the labellum whitish, strongly marked with magenta, with a long, very obtuse spur. I thought at the time that it might very likely be a northern variation of *S. parviflorus*, but I was unable to recollect the detailed structure of the latter. I am now convinced that it is quite distinct from *S. parviflorus*, nor does it agree with any species hitherto known to me. Further particulars with regard to this orchid are given below. In this same brush there did not appear to be many orchids beyond those mentioned; *Bulbophyllum shepherdi* and *B. exiguum* were seen, and a few *Dendrobium gracilicaule*. On the margin of the brush we found masses of *Bulbophyllum elisae* growing on forest oaks (*Casuarina torulosa*), which also carried *Dendrobium Fairfaxii*. We then rode down into Massie's Creek again, and followed it up as far as the horses could go, when we explored the brush there on foot. At the entrance I found the only two plants of *Sarcochilus divitiflorus* seen during the whole trip. This, certainly the most striking, if not the most beautiful of all our N.S.W. *Sarcochili*, is much more abundant in one or two of the Paterson brushes. *Cleisostoma Beckleri* was growing on Backhousia bushes, and at Christmas time or in

January this brush must be a veritable showground of the lovely *Calanthe veratrifolia*. I should have liked to explore further up the creek, for I had hopes of finding *Sarcophilus Fitzgeraldi* in such a place, but evening was drawing on and we had to return to Ecclestone.

(To be concluded.)

THE ENTOMOLOGICAL LIFE OF THE PILLIGA SCRUB.

By WALTER W. FROGGATT, F.L.S.

During my forestry work last summer (1924-25) I paid two visits to that interesting area in the north-west known as the Pilliga Scrub. This extensive scrub forest, comprising 2,000,000 acres, is all level red soil country, covered with typical western scrub timber trees and shrubs, forming a more or less open forest.

There is no permanent surface water, but a number of broad sandy creeks fringed with red-gum trees intersect it, which hold a little water after a heavy fall of rain, the sand most beneath producing small gum saplings, "bitter bark" and "hop bush."

There are artesian bores in several places which, overflowing into the surrounding depression, form small water courses in the immediate vicinity.

Many years ago the greater part of this country was held under grazing leases. These are now abandoned, marked only by dilapidated fences, and by excavations in the creeks. At the present time a large portion of the area is included in State Forest Reserves, and there are some soldier settlements on the northern fringe.

Roughly defined, it lies to the west of Narrabri and Wee Waa, with the Namoi River above the northern portion, and the inland side is reached from Baradine and Pilliga, both old-time townships of the coaching days.

The botanists have issued a departmental bulletin giving a botanical survey of the interesting flora of the Pilliga, typical of our western scrubs. Among others the authors list 30 different species of Acacias. The dominant useful timber trees are the Cypress pines and iron barks. Dr. Jenson made a soil survey of the district some years ago, which was also published in bulletin form.

Many thousands of ironbark railway sleepers are being cut in this forest, and there are a number of sawmills scattered

about which are cutting up cypress pine.

My first visit was made in October to Narrabri, the headquarters of the District Forester, Mr. Gordon Burrows. He took me over the forest reserves of the eastern side, and assisted me in gathering together part of the collection noted in this paper.

I spent the first day at the Forest Plantation, in typical scrub, about twenty miles from the town. Here some necessary clearing and ringbarking had been carried out during the previous year. On examining the dead ironbark saplings, I found the half-dead bark below the ringed bark, occupied by colonies of naked red-tinted larvae of the "Goat Moth" (*Culama caliginosa*). These were nearly full-grown; later I bred a fine series of the moths from larvae which pupated in the breeding cages. The dead wood of the stems of these trees had also been attacked by the larva of a larger wood-boring moth. Several of these were carefully cut out, and removed in the pupal state in sections of the stem; two of these subsequently developed and proved to be an undetermined species of the genus *Zeuzera*.

Ground insects were not plentiful after the long dry spell on this dry soil; but both "white ants" (*Termites*) and ants (*Formicidae*) were fairly numerous, the dominant "bull-dog" ant being *Myrmecia gulosa*.

The enormous number of great bark spiders and their numerous families must result in an active hunting for food supplies; all through the pine scrub every dead stump sheltered one of these great grey spiders. It is hard to see what they all live upon. Stripping the bark off some felled iron bark logs, which I saw had been attacked by the Biscuit-brown Longicorn (*Phoracantha recurva*), numbers of the pink hairy larvae of the Yellow-horned Clerid beetle (*Trogodendron fasciculatum*) were also exposed; these had evidently devoured the majority of Longicorn larvae. Removing the dry hard bark from an adjacent dead cypress pine, I cut out a number of the handsome yellow and green Buprestid beetle (*Diadoxus erythura*) which at this time of the year is found ready to emerge through the dead bark all through the cypress pine country. The Officer-in-Charge of the plantation gave me a pair of what he called "Aeroplane" beetles. He said he could have taken a hundred, one hot summer's day, as they were flying all round a cleared patch of forest where they were burning off the scrub. They were making a loud humming noise, and with their boat-shaped bodies and expanded wings re-

mind him of an aeroplane. They proved to be very fine specimens of the large, previously rare, Buprestid beetle (*Stigmodera fortunei*) of which I had only two specimens, one from Dubbo, and another from Bourke.

On the following day we visited another forest plantation in the pine scrub beyond Wee Waa, where, among other trees, a number of *Acacia pycnantha* had been planted the previous year. Some of the trees were dead, and others, sickly, were turning yellow. Chopping up a section of the dead stems, I found they were thickly infested with the larvae of a small flat-backed weevil (*Laemosaccus* sp.). Numbers of these beetles had been collected on the previous day, feeding upon the bark of a fallen gum tree. The yellowing wattles were found to be full of "pin-hole" borers, chiefly small "spine-tailed" Bostrychids (*Xylobosca bispinosa*) and large "Auger" beetles. The latter (*Bostrychopsis jesuita*) in some cases were tunnelling inside the branchlets. In another wattle I took two dozen of them on the outside; they were just starting their circular holes through the bark, and dropped to the ground when I approached the bush.

When examining a clump of "Bitter Bark" (*Alstonia cor-stricta*) on the roadside, I found many showing damage by Longicorn beetle larvae, but the beetles had evidently emerged the previous season. In a grove of "Weeping Myalls" (*Acacia pendula*) on the edge of the scrub I found some dead branchlets containing Longicorn larvae; these larvae have not developed up to date. Among other Longicorns taken on this area was a large Prionid beetle, found under the loose bark of a River Oak (*Casuarina* sp.). The large white larvae live in the base of the stems of these trees, and were once cut out and eaten by the blacks. They are a favourite bait of the inland fisherman. Two fine specimens of the "mottled longicorn" (*Rhytiphora odiwahni*) were given me by a forest officer; they were taken on a wattle.

On the trunk of a Kurrajong I found specimens of the two grey-marbled weevils (*Axonius insignis* and *Tepperia sterculiæ*) both wonderful examples of protective mimicry as their colouration blends in a most perfect manner, with the cracked bark in which they hide. In their earlier stages the larvae of the former live in dead stems, and those of the latter develop in the seed pods of their host tree.

In Narrabri I was invited to see an invasion of white ants (*Coptotermes lacteus*) which had made their way through

the floor of the shire office. They had worked their way round the cypress pine shelving which they had not touched; but were busily engaged in devouring the closely packed rate-book records in the pine pigeon holes.

My second visit to the Pilliga Scrub was made in the middle of last January, and my headquarters were the township of Baradine, where Mr. B. Harris, the Forest Officer-in-Charge of this district arranged to take me round: and under his able guidance I spent a most interesting five days in the pine forests between Baradine and Pilliga.

At this date the whole of the north-western plains were suffering from a locust invasion. At Baradine these locusts (*Chortoicetes terminifera*) were flying low over the plains right up to the edge of the scrub; and the dry creek bed, behind the school, was covered with them, feeding on the grass and rushes. The creek banks were fringed with red-gum saplings, beneath the large trees; and the whole of the foliage was thickly covered with the sugary scales of the "Manna Lerp" (*Spondylaspis eucalypti*). This infestation had attracted a large number of Lady-bird beetles (*Coccinellidae*), and in the early morning I collected a large series of *Coccinella repanda*, *Alesia frenata*, *Leis conformis*, *Scymnus noticens*, *S. sydneyensis*, and *Cryptolaemus montrouzieri* feeding upon the lerp insects. The "Pumpkin" beetles (*Aulacophora oliveri*) were also very numerous on this foliage; but they were sucking up the sugary portion of the moist lerp scales.

Two species of plant bugs of the genus *Amorbus* were puncturing the young tips of the gum shoots; the common species, *Amorbus rubiginosus*, with its brightly tinted larval forms were very plentiful.

Numbers of a large Cicada were calling in the tops of the gum trees, they were up too high to distinguish the species. Later I captured one in the scrub, which proved to be the common brown one about Sydney (*Macrotristria angularis*). This is the first record of it being found in the western country.

About five miles out from the township we spent an afternoon in the open scrub, consisting chiefly of wattles and iron-bark saplings. The commonest beetles upon the wattles were the small grey weevils *Myllocerus multimaculata*, *M. usitatus* and an undetermined species; several specimens of *Belus*, and one specimen of a curious reddish weevil, *Strongylorrhinus ochraceus* were also taken on the twigs.

The wattle longicorns were represented by two specimens of *Symphyletes lateralis*, and several specimens of *Hebecerus crocogaster*; and as the bark of many of the branchlets bore evidence of having been nibbled, it is probable that other species had been numerous earlier in the season.

On a gum sapling I took two specimens of the fine longicorn (*Platyomopsis obliqua*) clinging to the topmost branchlet; it has a wide range. I took a pair in a similar situation at Deniliquin a few years ago. Here also I found a gum where the foliage was infested with "white scale" *Eriococcus coriaceus*. The adult scales had exuded a quantity of honey dew, so attractive to *Hymenoptera* and *Diptera*, I caught four undetermined *Thynnid* wasps, several *Evania*, some minute *Chalcid* wasps, and a few *Braconids*. Flies were not common, those upon this gum but among the wattles were *Sarcophaga*.

Turning over some old logs where the woodcutters had been at work, several fine *Heteromera* (Ground beetles) were uncovered, among them were *Onosterrhus squamosus*, *Pterohlaeus piceus*, *P. bullatus*, *Cardiothorax curvipes*, *Nyctozoilus* sp.

(To be concluded.)

THE VOICE OF THE WHIP-BIRD.

By A. H. CHISHOLM.

With the exception of the hearty "laughter" of the kookaburra, and possibly the extraordinary wail of the cat-bird, is there any more distinctive bird-voice in Australia than that of the whip-bird? Indeed, I am inclined to suggest that this small bird stands out from all but a half-dozen of its kind the world over by the challenging nature of one particular note.

The kookaburra, the bell-birds, the lyre-birds, the bower-birds—these and others have remarkable voices, but in each case a series of notes or calls goes to make up the novel utterance, and in some cases several birds are needed to give the full effect. Not so with the cat-bird. His (and her?) child-like cry is, so to speak, self-contained, and sufficient in itself, though, of course, the effect strengthens when a batch of birds are "on the job." So with the whip-bird. His fame rests largely on a single note, and when that note is being given by six or eight birds together on a Spring morning—well, there is no heartier or more stimulating sound in the Australian bush. And in those qualities, by the way, the whip-bird greatly improves on the cat-bird; his note is briefer, brisker, and infinitely brighter than the wail of the larger bird. It follows that the scrubs and jungles of the east Australian coast, from Victoria to Cape

York, would be a good deal less attractive than they are if *Psophodes* of the whip-crack were not one of their most prominent birds. Give thanks for the fact that there seems no probability of it following the black-throated whip-bird, of West Australia, which has not been recorded for many years, and is probably extinct.

It is not to be supposed, of course, that the voice of the whip-bird is restricted to the vigorous, whip-like "explosion" that has given the bird its vernacular and technical names. Occasionally, the crack is uttered without any preliminary, but more often you may hear a running "Ta-ta-taaaa—" leading into the main note. More often still the crack is heralded by a long-drawn "Tuuuuuu," as though the vocalist were taking a deep breath in order to fling out the resounding "Whit" to the best effect. And what a burst of sound that crack can be! Watch a whip-bird calling at full steam, so to say, and you will be alarmed lest the rollicking creature splits his little body asunder with the volume of sound. Sometimes the bird almost falls over with the force of his effort. That kind of thing, superficially, is not conducive to melody, but when a group of whip-birds are making the welkin dance in company, the individual shouting frequently blends into an harmonious chorus. Thus, I was amused to discover, on the Macpherson Range, Queensland, that a group of whip-birds with the spirit of Spring in their veins were giving an excellent imitation of a couple of bars of that old song, "Scenes that are Brightest," each line being rounded off with a vigorous crack.

As a usual rule the whip-like note is followed quickly by two others. Sometimes this addition is a distinct "Choo-choo." Sometimes it is a sweet "Tu-weeee." Is a second bird responsible for these notes? That question has been a fruitful source of argument for many years. Many people doubted whether the bird uttering the loud crack would be able to recover quickly enough to add the soft notes. Others doubted whether another bird could "time" so nicely as to cause the "Tu-weeee" almost to blend with the crack. The question is settled now. It has been proved definitely that two birds usually take part in the call, one uttering the prelude and the crack and the other chiming in quickly; but if the lady is not willing to bear her part the male bird is quite able to render the whole bar alone.

A kindred point is the question as to whether the female whip-bird is able to cause the loud crack. Personally, I am almost certain that she has little less ability than the male bird in this respect, but does not use her ability so often. At all events, the little lady is certainly able to utter that modified



THE SPRIGHTLY WHIP-BIRD.

Photo by R. T. Littlejohns and S. A. Lawrence.

crack that you sometimes hear from a whip-bird—one that has no accompaniment and is only a whisper of the marvellous vocal explosion that constitutes the real challenge of the whip-bird. I use the word “challenge” in a general sense, of course, and am not necessarily suggesting that the whip-crack is used for an offensive or a defensive purpose. Some observers think it is used as a call, a guide, an indication of whereabouts. That seems to me a weak theory. Whatever the cause of the origin of the call, it seems to me now to be almost entirely a mere expression of *joie de vivre*—and as such there are few sounds in the world to surpass it.

I hasten to add, in concluding these casual notes, that the voice of the whip-bird is by no means exhausted with notes centring upon or about the one distinctive note, the famous crack. When the quaint little babes are being led abroad you may hear a throaty “Too-clar, too-clar” and other clucking sounds in frequent use; and in the non-nesting period a shrewd ear may detect a talkative *Psophodes* entertaining himself (or herself) with a sweet little chatter that almost rivals the best of Whisper Songs. Certainly this blithe little Australian has a broader vocal ability than is usually placed to the credit of whip-birds.

INSECT SCAVENGERS FOUND ON THE NORTH WEST PLAINS.

With Some Observations on *Saprinus laetus*.

By A. R. WOODHILL, B.Sc. (Agr.).

The essential part which the process of decay takes in the cycle of nature is of course well known. By it, dead plant and animal matter is broken down into inorganic substances, which can be absorbed by plant life, or built up into living animal matter again.

A number of agencies are at work in this process of breaking down and building up, including bacteria, fungi, and animals, including birds and insects. The lastnamed play a most important part in hastening the process of decay, and in cleaning up waste animal matter. As soon as an animal dies in the paddock, large numbers of insects are attracted to feed and lay their eggs, and the flesh is rapidly broken down by the countless numbers of larvae, as well as by adult insects. The common sheep blowflies and the *Sarcophagid* flies are the first to arrive, and are followed quickly by the carrion beetles. When the carcase has reached an advanced stage of decomposition the thin wire-like larvae of *Australophyra analis* are most abundant, and these together with the carrion beetles complete the work of destruction after the blowfly larvae have left the carcase. *Trox* spp. and the so-called "skin beetle" *Dermestis cadaverinus* are the last to leave the carcase, and may be found on old dried up carcasses, apparently not deserting them, while a shred of flesh remains.

The following is some of the species of flies and beetles commonly found under carcasses on the north-west Plains:—

DIPTERA (Flies).

Chrysomya albiceps, *Chrysomya varipes*, *Chrysomya micropogon*, *Anastellorhina augur*, *Neopollenia stygia*, *Lucilia sericata*, *Sarcophaga aurifrons*, *Australophyra analis*.

COLEOPTERA (Beetles).

Creophilus erythrocephalus, *Dermestis cadaverinus*, *Trox* spp., *Saprinus laetus*.

Of the beetles the Histerid (*Saprinus laetus*) is the commonest species, and is usually found in large numbers under any carcase.

It is interesting from an economic point of view in that it destroys large numbers of blowfly pupae, being predatory in its habits, as well as feeding upon decaying flesh.

The larva is a whitish or cream coloured grub, very active, tapering towards the head, and about 15 mm. long, and 1.5 mm. broad. The prothorax and head are reddish brown, the legs small, but well developed, and the jaws strong and curved. When full grown they crawl into the soil and pupate; in some cases, where the soil is loose, forming earthen cells, composed of particles of the soil stuck together. The pupa is cream coloured, about 5 mm. in length, with the outline of the future beetle plainly visible.

The adult is a small shining beetle, 4.6 mm. long and 3.4 mm. broad. The upper surface of the prothorax and head is dark bronze; the elytra (wing covers) and upper surface of the abdomen dark metallic blue with the legs and under surface shining black. The lateral margins of the prothorax and the greater part of the elytra are finely punctured, with four longitudinal striae on the basal portion of each elytra. The head is bent under the prothorax so that it cannot be seen from above, and is furnished with strong curved mandibles. The elytra are short, exposing the two terminal abdominal segments. The antennae are clubbed and the tibiae of the fore-legs, and to a lesser degree of the other legs, are flattened and toothed, being adapted for digging through soil and decaying matter. The beetles are found at any time of the year, though they were most abundant from October to April, during which period the larvae were also observed. Wherever a carcase was turned over in the field the beetles were found feeding on the decaying tissue or on blowfly pupae, but where accumulations of the latter occurred the adults were more plentiful than on the decaying flesh. The larvae were only seen feeding on blowfly pupae. The larvae were not able to penetrate the tough spiny pupae of *Chrysomya albiceps*, but fed readily on the softer smooth pupae of *Anastellorhina augur*, *Neopollenia stygia* and *Lucilia sericata*.

The shell of the pupae is torn open by the aid of the strong jaws of the beetle larva which feeds on the semi-liquid matter within. The adults can fly well, but their power of flight is not readily availed of in the day time. They must have a strongly developed sense of smell, as large numbers of them were caught in fly traps out on the open plain within a few days of baiting the trap: any decaying carcase was also quickly found by them.

The eggs were not observed, but minute newly hatched larvae were bred through in December, 1924, giving the length of the larval and pupal periods as follows:—

Larval period, 5 to 8 days. Pupal period, 18 to 19 days.

HABITS OF CERTAIN ORCHIDS.

By REV. H. M. R. RUPP, Bulahdelah.

May I first correct two misprints in my previous article in *The Australian Naturalist* of April, 1924. *Corysanthes primosa* should be *C. pruinosa*, and *C. unguiculata* should be *C. unguiculata*.

With regard to the notes and diagrams concerning two Tasmanian forms of *Pterostylis*, the whole matter there discussed has been cleared up to my own satisfaction by Dr. R. S. Rogers, of Adelaide. Dr. Rogers kindly sent me his paper on "Certain Species of *Pterostylis*" (Royal Society of Victoria, November, 1915), and after studying this I sent him various specimens from my herbarium, including the two figured in the *Naturalist*. As a result of his reports on these specimens, I gather that in the past there has been confusion between various forms of *Pterostylis* passing under the names of *P. cucullata*, and *P. Mackibboni*. The Mount Wellington plant is, as Mr. Rodway suggested, the true *P. cucullata*, which is somewhat variable, and in a dwarf almost stemless form was known as *P. Mackibboni*. The other plant of my diagram, labelled *P. cucullata* (Mount Barrow), is quite distinct from that species, and Dr. Rogers pronounces it identical with the plant he has described under the new specific name of *P. falcata*. The two figures in my sketch in the *Naturalist* should therefore be labelled respectively *P. cucullata*, R.Br. (Mount Wellington), and *P. falcata*, Rogers (Mount Barrow).

Dr. Rogers has informed me that Lindley's name, *Spiculaea*, has been restored to our eastern *Drakoeas*, the latter name being now restricted to a few species peculiar to Western Australia.

Rev. H. M. R. Rupp, B.A., of the rectory, Paterson, N.S.W., a former student of Trinity College, has presented to the Melbourne University, after consultation with the warden of Trinity (Dr. Behan), his valuable collection of over 2,000 specimens of New South Wales, Victorian and Tasmanian plants, together with a collection of the fruits of native plants. The herbarium represents the loving work of between 25 and 30 years' gathering by an enthusiastic botanist. Professor Ewart, through whom the gift is made, says:—"As the naming is reliable, it forms a valuable addition to the University botanical department, helping to fill up a serious gap in the equipment of the department."

The Australian Naturalist

Vol. VI.

JUNE, 1926.

Part 2.

TEN DAYS ON THE UPPER ALLYN RIVER.

By REV. H. M. R. RUPP.

(Concluded from last Issue.)

The second and most formidable of my longer excursions involved the climbing of Bald Knob, a little over 4,000 ft. high, and 12 miles up the Allyn River. Our principal objective here was the fine forest of *Fagus Moorei* (known in South Queensland as the Antaretic Beech, and on the Dorrigo as the Nigger-head Beech) which skirts the summit of Bald Knob. Here I hoped to find the beautiful *Dendrobium falcorostrum*, whose only host this Beech is said to be. We left before 7 a.m., and drove 8 or 9 miles up the valley of the Allyn, with about 12 crossings, most of which were atrociously rough. The sky was threatening, and we were to have the experience of being wet through nearly all day, finding upon our return to Eccleston under a clear sky at night that the dust was scarcely laid there. We changed sulky for saddles at the last settler's home in the valley, and almost immediately entered an extensive and beautiful brush. I should have been glad to spend some hours in this, but time did not permit. The track was blocked in many places as the result of a recent violent windstorm, and vines and saplings had to be chopped to clear a way. We came across the dainty *Dendrobium Mortii* here, and also found a few more flowering plants of the little unknown *Sarcophilus*. Then we emerged from the brush and began to climb in earnest. Only horses accustomed to the mountains could carry men where ours carried us that day. I felt that I should be qualified to chase flies up the walls of a house when I got back! At about 3,000 ft. heavy mountain mists came down on us, and remained with slight intervals all the time we were on the Knob. At last we reached the beeches. I was familiar with *Fagus Cunninghamii* in Victoria, and with that species and *F.*

Gunnii in Tasmania, but this was my first introduction to *F. Moorei*. I had not expected to find it equal in dimensions or beauty to *F. Cunninghamii*, but I capitulated at first sight. I have never seen anything of the kind that can come up to that glorious forest of majestic and beautiful trees, their mighty trunks often densely clothed for 40 or 50 ft. with moss of pure gold. Most of them were monarchs among trees long before Captain Cook sighted Australia, and we gazed on some of the veterans and wondered how many centuries had passed since they were saplings. The foliage is much larger than that of either of the other species, and may be compared with that of the elm-tree. *Dendrobium pugioniforme* hung in festoons from the mossy beeches everywhere, and *Sarcochilus falcatus* was there literally in thousands. Lower down it had nearly finished flowering: here it was mostly in bud. We did not get *D. falcorostrum*, though it was known to have been found there, and Mr. Hopson himself had seen it. We were fairly sure we saw a plant once or twice, but they were so high up on such immense trees that it was a case of "sour grapes." It was here that I saw a single specimen, withering, of *Pterostylis longifolia*. Among the non-orchidaceous plants I noticed *Coprosma Billardieri*, *Olearia stellulata*, and *Banksia marginata*; and a little further down *Podolepis acuminata* and *Acacia adunca*. We had not time to investigate as closely as I should have liked: as it was, it was 8 p.m. when we got back to Eccleston after our 13-hour expedition.

"Hosts" of Orchids.

A list of orchids and their "hosts" may be of interest. The following is compiled from my notes:—

Orchids:	Growing on:
<i>Dendrobium speciosum</i> .	<i>Casuarina Cunninghamiana</i> , <i>Laportea gigas</i> , <i>Brachychiton</i> <i>populneum</i> , <i>Ackama Muel-</i> <i>leri</i> , <i>Panax elegans</i> , as well as rocks.
<i>D. gracilicaule</i> .	Almost any brush forest tree except <i>Eucalyptus</i> and <i>Syn-</i> <i>carpia</i> ; also <i>Casuarina Cun-</i> <i>ninghamiana</i> . Sometimes on rocks.

D. pugioniforme.

Fagus Moorei, *Pittosporum undulatum*, *Backhousia myrtifolia*, *Trochocarpa laurina*, *Callicoma serratifolia*, *Orites excelsa*.

D. linguiforme.

Trees too numerous to specify. Often on the paper-bark, *Melaleucas*. A large clump is growing on a fine English elm by the Allyn River. Frequently on rocks. *Casuarina Cunninghamiana*, *Callicoma serratifolia*, *Ehretia acuminata*, and other trees.

D. Beckleri.

D. Mortii.

On the thick stems of immense vines of *Vitis hypoglauca*.

Bulbophyllum Elisae.

Casuarina torulosa only.

Sarcochilus divitiflorus.

Litsaea dealbata, *Pseudomorus Brunoniana*.

S. falcatus.

(Also *Casuarina torulosa*).

Fagus Moorei, *Baloghia lucida*, *Panax elegans*, *Vitis* sp., *Backhousia myrtifolia*, *Orites excelsa*, *Pseudomorus*, *Backhousia*, *Baloghia*, *Trochocarpa laurina*, *Cudrania javanensis*, and many others.

S. olivaceus.

Trochocarpa laurina, *Backhousia*.

S. sp. ?

Melaleuca styphelioides, *Cudrania javanensis*, and many small brush trees.

S. Hillii.

A New Sarcochilus ?

If the *Sarcochilus* found in two of the brushes above Eccleston is an undescribed species, I cannot claim priority of discovery. On the day I left for Eccleston, I received a letter from Miss Hilda Geissmann, of Tambourine Mountain, Queensland, describing a *Sarcochilus* unknown to her which she had just found. Subsequently she sent me an excellent photograph. The description and photograph leave no doubt whatever in my mind that her orchid is identical with that which I came upon a few days afterwards in the mountains beyond Eccleston. The

plant has obvious affinities with *S. parviflorus*, but is generally smaller, and does not appear to carry more than 3 or 4 blooms. The sepals and petals are similar to those of *S. parviflorus*, but the labellum is very different. *S. parviflorus* has two broad side-lobes like *S. falcatus*, striped inside with purple, the purplish appendages at the rear being scarcely visible from the front. In the new plant the side-lobes are almost linear, bulging and flattened at the top, where there are a few red streaks: the appendages are white and prominently visible from the front. The spur of *S. parviflorus* is almost conical and is pure white: that of the new plant becomes suddenly narrow and elongate, but is very blunt: the narrow part is blotched all over with magenta. The mid-lobe of *S. parviflorus* is minute, with a splash of purple underneath and below the tip. That of the new plant is broad, the front margin being of a bright magenta colour. The space below the column in *S. parviflorus* is faintly streaked or blotched with purple: in the other it is simply marked with two straight sharply-defined red-brown lines. If this is a new species, I venture to hope that it may be called after the discoverer, whose enthusiasm for botany and beautiful orchid-photography work seem to me to merit the honour of having her name perpetuated in this way.

THE ENTOMOLOGICAL LIFE OF THE PILLIGA SCRUB.

By WALTER W. FROGGATT, F.L.S.

(Concluded from last Issue.)

We left Baradine for a three days' trip early on the morning of the 20th January, driving for ten miles through close scrub composed of cypress pine, ironbark, casuarina and wattles. Coming out into the open country we encountered the plague locusts previously mentioned. They were floating along, rising about six to ten feet above the ground, in unbroken clouds. At Taylor's homestead, where we stopped for lunch, we found the family had covered the lawn with bags, and had enclosed the young orange trees in chaff bags tied round the trunk to save them from the advancing swarms that were reported to extend across the open country for fifty miles. I noticed a number of the orange tree butterfly (*Papilio aegaeus*) hovering about the garden and later on saw them far in the scrub; this is quite a modern invasion, as until the last few years its range was limited to the eastern coast land. As the "Wild Lime" (*Eremocitrus glauca*) extends into the Pilliga, this butterfly will probably become a settled resident in the western scrub forests.

There were some very beautiful specimens of the Weeping Myall planted at the homestead; one 25 years old was a magnificent tree, others were fifteen years old.

After leaving the horse paddock we again entered the scrub where there were some very fine trees, the Gobo Forest-reserve. We stopped at the Forest-guard's cottage for the night. Here there is a fine artesian bore, a forest plantation and also a waterhole dammed back in the creek. Next morning, collecting along the creek, we found a "Cockchafer" beetle (*Anoplognathus oliveri*) and one specimen of *Repsimus aeneus* feeding upon the gum foliage. Two other Lamellicorns, *Trox australasiae* and *T. asperatus* were found in the soil under some old sheep skins near the house, also several specimens of the maggot-eating Staphylinid, popularly known as the "Devil's Coach-horse" (*Creophilus erythrocephalus*) and a small Clerid beetle (*Paederus cruentatus*) common under stones in the forest.

Turning over all the larger fallen logs in the adjacent pine scrub, I obtained the following fine wingless Carabs, *Philoscaphus tuberculatus*, *Carenum interruptum*, *C. elegans* and *C. distinctum*, *Helluo costatus*, another dry country carab was also found here.

Upon the wattles the typical Membracid (*Sextius viriscens*) was very plentiful; and I found one specimen of the "Painted Bug" (*Peltophora pedicellata*). This is a common bug on the coast, often damaging soft fruits. The active black ground-bug (*Dieuches scutellatus*) with its very characteristic white markings was common under fallen logs. One specimen of a handsome black and red "Assassin Bug" (*Tegia atropicta*), was found in a similar situation.

Leaving the Forester's cottage at midday, we took a cross-country track through such close scrub that there was little or no grass, the soil being coated with pine and she-oak needles; travelling along, the most prominent land marks were some remarkable ants' nests or rather groups of ants' nests varying from two to six in number. Each was a funnel shaped earthen cone, over a foot in diameter at the base, tapering up to a blunt point and averaging a foot in height, with the opening at the apex. They were the homes of a large yellow ant (*Camponotus* sp.). Later we stopped at a bore, where the overflow formed a narrow miniature lagoon. Sheltering under the rubbish along the water's edge, I caught a fine series of the pretty little Carab (*Chlaenius darlingensis*) and also one specimen of another mud-loving Carab beetle (*Clivina basalis*).

Within a short distance from the bore gate we passed a clump of Prickly Pear (*Opuntia inermis*) and for the next few miles it was scattered all through the forest. Mr. Harris said that it had become established all over this side of the forest, and we passed a number of clumps driving through next day. Turning into a cleared track through the sand we came at sunset to the township of Gwabegar, the terminus of the railway line from Baradine, which ends in a patch of cypress pine scrub.

An enterprising timber man has built a very fine up-to-date hotel fitted with electric light and hot and cold water. A broad verandah runs round three sides of the second storey, and here I spent a very profitable evening, under an electric light, collecting the many small insects resting on the wall, attracted out of the surrounding forest. The only large insects, however, were a specimen of the cosmopolitan Hawk Moth (*Chaerocampa scrofa*) which has a very wide range over Australia, and the great green and black spotted grasshopper (*Ephipitytha 32-punctata*) which I had never previously seen in the west. Many small earwigs, crickets, froghoppers, micro-lepidoptera and a few ants were collected. The small moths have been given to Mr. Goldfinch. Among the Homoptera, *Prevesa aphrophorades* and two species of *Eurybrachus* were the most common.

We drove off early next morning through thick scrub, passing several sleeper-getters' camps; we stopped to rest the horses at a bore, where the overflow has formed much deeper ponds than those previously examined. Here, with my butterfly net, I made an interesting haul of water beetles, water bugs, and dragon fly larvae. Among the former were *Cybister tripunctatus*, *Eretes dorsalis*, *Stenolophus tenebrosus*, *Copelatus ater* and *Necterosoma pencellatus*. The common water bug *Procorixa eurynome* was also plentiful.

Crossing several broad sandy creeks we stopped at midday at a cypress pine sawmill where Mr. Harris had some business. I hunted through the bush and along the creek bed; a large clump of "Brigalow" (*Acacia harpophylla*) stood out on one side of the plain, but its dry stiff foliage yielded no insects, either by shaking or sweeping with the net. I therefore turned into the hot sandy bed of the creek, but there was nothing on the gum saplings except the large black "Frog-hoppers" (*Eury-mela distincta*), the typical species of this fine genus all over the west. The only prize was a chance find of a specimen of the beautiful metallic-tinted Buprestid beetle (*Melobasis sex-plagiata*) under a piece of dead bark on the trunk of a red gum.

During the afternoon we passed a large "Bumble Tree" (*Capparis mitchelli*) the three main stems were encircled with matted wads of yellow sawdust; these bands were two feet deep, and were caused by the gregarious larvae of the "Capparis Moth" (*Stylopiis agenor*) burrowing into the wood. A section was cut off for the forestry museum collection. From further observations on these trees, it is evident that most of them are killed by these borers when old and matured.

The "Bumble Tree" is also one of the scrub trees that the larvae of the White Butterfly (*Belenois java*) often feeds upon, though the "Warrior Bush" (*Eriomophla longifolia*) is preferred by these slender olive green caterpillars. When the latter have been numerous, it is a common sight in the early summer to see one of these bushes in the early morning, so thickly covered with the butterflies, which have emerged from the pupal cases during the night, that it appears to be snow white. This is the same white butterfly that sometimes migrates in countless millions, fly eastward and occasionally reach Sydney, many ending their flight in the ocean.

Under a dead log on the roadside, half buried in the dead wood, were several specimens of the small black stag beetle, *Figulus regularis*.

We arrived at the scattered little township of Pilliga towards dusk. Next morning I followed round the lagoon, but could find nothing among the water weeds, so crossed the broad road and investigated the low wattle, bitter bark, and gum saplings on the loose sandy soil beside the church, and found several large brown weevils (*Leptops duponti*), popularly known as "Wattle Pigs" by the Sydney school boys. A number of ant-lion pits were found in the sand in several places in the scrub, and here I caught the only adult specimen seen, identical with a species (*Austrogymnsenemia australis*), the type specimen of which was taken at Brewarrina. Collecting the ripe seeds of a "Boree" (*Acacia oswaldi*) I found nearly all the enclosed seeds devoured by some small weevil grubs. Several were still in the hollowed out seeds, where they were ready to pupate, and are now under observation.

On the gum foliage three species of the leaf-eating *Paropsis* were captured, *Paropsis variolosa*, *P. immaculata* and *P. propinqua*; here also I netted on the foliage three specimens, two winged males and a wingless female, of a very handsome Thynnid wasp, closely allied to a North Queensland species.

I returned to the hotel about ten o'clock and found my com-

panion harnessed up and ready to start on the back track; and, taking a more direct route, we reached Baradine late in the evening, after a most interesting trip through the "Big Scrub."

ORDINARY MEETINGS.

February 2nd, 1926. The President, Dr. I. M. Mackerras, in the chair.

The evening was devoted to a demonstration, with the projecting microscope, by Mr. H. R. Harrington, a member of the Society. He explained in detail the structure of the instrument and the effect of the various combinations of lens used. A long series of microscopic slides was shown and described by Mr. Harrington.

The demonstration was much appreciated, and Mr. Harrington was accorded a hearty vote of thanks.

March 2nd, 1926.—The President, Dr. I. M. Mackerras presided over a meeting of thirty-five members.

The President referred to the resignation of the Hon. Treasurer of the Society, Mr. E. H. Zeck, in view of his departure for Mexico City. On the motion of the President, seconded by Mr. P. D. F. Murray, and supported by Mr. A. E. Watson, members expressed their unanimous appreciation of the services of Mr. Zeck to the Naturalists' Society.

Professor Griffith Taylor delivered a lecture on the "Future White Settlement of Australia." The lecture was illustrated by an interesting series of lantern slides, reproduced from photographs taken by Professor Taylor himself at intervals of 200 miles during expeditions across Australia. The slides were explained by the lecturer, and gave members a very good impression of the nature of the country met with. Professor Griffith Taylor strongly emphasised the desirability of more closely settling the known agricultural and pastoral areas of Australia before considering Central Australia which, while it would grow both sheep and cattle, could not be expected to support more than a scattered population.

The meeting concluded with a hearty vote of thanks to the lecturer.

May 4th.—Dr. I. M. Mackerras presided over twenty-nine members.

Mrs. Jenkins exhibited a specimen of the Cotton Cushion or Fluted Scale (*Icerya purchase*). This is a native species of mealy bug usually found on Wattle (*Acacia*), but also occurring on a number of garden plants such as roses and *Pitto-*

sporum. It was also occasionally found on citrus trees, but never became abundant enough to be a pest, being kept in check by lady-bird beetles (*Novius*) and by a small parasitic fly (*Cryptochaetum*).

Mr. W. W. Froggatt exhibited caterpillars of one of the Australian silkworm moths (*Antheraea simplex*) found feeding on *Callicoma* sp.

Owing to illness, Professor Harrison was unable to be present to give his lecture on the "The Platypus." Mr. W. W. Froggatt, with his characteristic readiness in an emergency, gave a very striking account of the red gum forests and their zoology.

In the discussion which followed, Mr. Cheel gave an account of the botanical position and distribution of the red gum, and Mr. Stead referred to the glory of the red gum forests. Both he and Mr. Cheel referred to the unnecessary destruction of red gum trees in proximity to many country towns.

Mr. Froggatt's reference to the dropping of the young cormorants from their nests into the water when disturbed evoked a further discussion on the manner in which birds carry their young in periods of parental stress. Mr. A. H. Chisholm also joined in this phase of the discussion. He gave a summary of the known information on the subject, and recounted his own personal experiences. He referred to the wide field of study offering and the need for further original observations. Are there any members who can furnish particulars of original observations for publication in the next issue as to the manner in which birds carry their young?

THE OUTDOOR NATURE SCHOOL.

By GEORGE H. WRIGHT.

At this stage in the development of our continent when much (alas! not all) of the wild life remains with but little change since the not-far-distant days of white settlement it surely becomes a national duty to study in faithful detail the type and conditions of that unique flora and fauna which is ours so that we may hand on to posterity all that is best and good.

To the naturalists of Australia is committed this task.

Those who have laboured in the past,—Gould, Maiden, to mention two names in a host of many,—have pioneered the way in exemplary manner; those who work to-day—Froggatt, Dodd, names that come in a list which grows before me—are giving to a not over-grateful public the observations and re-

searches of a life-time.

But there remains yet a tremendous field to explore, and to the naturalists of to-morrow is committed this responsibility.

Obviously these leaders of the future must be recruited from the army of Australian children in attendance at our schools to-day. Our influence, as teachers then, on the outlook and training of these boys and girls is of high national consequence. The N.S.W. Education Department is handling this responsibility in a commendable manner, and its syllabus of the Primary School, outlining a sound course in Nature study that requires a definite time to be devoted to the subject each week, is continued in the curriculum of the Secondary School under the more specific branches (entomology, botany, geology, etc.), of the study. But every good scheme can be improved. Early this year an important step in this direction was taken when the Director of Education, Mr. S. H. Smith, with the co-operation of the Forestry Commissioner, Mr. Dalrymple Hay, encouraged and gave effect to the inauguration of the first "Outdoor Nature School."

The school, which was comprised of twenty-one boys (between the ages of 14 and 16 years) selected from metropolitan and city schools, and in charge of three teachers appointed by the Director, was held at Gosford State Nursery from 4th to 9th January, 1926. Although the aim in each case is essentially the same, the means by which the Outdoor School seeks to achieve its object differs greatly from those in indoor Nature work. Whereas in the latter case the specimens of the nature lesson are brought to the children, in the former, the children are taken to nature, and then encouraged to interpret her moods in the environment that breeds the enthusiast.

For our purpose no better field could have been chosen than Gosford Nursery. The nursery itself is an ideal field for the naturalist: surrounded by low hills, it nestles peacefully by the Narara over whose placid waters is cast the shadow of the tall sombre pines (*Pinus insignis*) which fringe the banks. A striking contrast this belt of pines makes with the native trees, taking us in thought far away to the cool temperate regions of the world; but a ramble among them brings one suddenly back to home for struggling up the stems and twining around the branches are the persistent sub-tropical climbers characteristic of our central coast flora. A glimpse of palm trees and bush house vegetation transports us to the tropics; the bush houses and nursery beds contain thousands of trees. In a few square yards are seedlings sufficient to plant a small forest, and with ease we lift the trays of seeds that are destined to rise into the mighty forests of the future. Tall stiff poplars, straight in a

row remind us of the trees that line the Appian Way, and we see in them the representatives of a typical Mediterranean flora. And so on we might go finding in the variety of vegetation that surrounds us, characteristic trees, types of the world's geographical regions.

It was my privilege to conduct Nature lessons in this delightful domain. Necessarily, with such a vast range of subjects at our disposal, a judicious choice of matter had to be made. The work was divided into the following broad divisions:—

- (a) Plant Life: Trees—epiphytes—parasites—saprophytes, plants of fresh water—plants of salt water—weeds and grasses of the forest, pasture and swamp.
- (b) Animal Life: Insects—vetrebrates—animals of the pond and stream.

The following shows the daily routine:—

- 6.30 a.m.—Rising bell.
- 7 a.m.—Swim.
- 7.45 a.m.—Breakfast.
- 9-11 —Excursion and instruction.
- 11-12 —Entering notes.
- 12-1.30.—Lunch.
- 2-4 —Practical work.
- 4-4.30.—Entering Notes.
- 4.30-5.—Recreation.
- 5.45.—Tea.

The big feature of the work was the daily excursion. On each occasion about twenty problems were set for study; these were discussed in a general way the previous night. The problems were written on sheets which were attached to the actual objects throughout the forest, field and by the stream and fresh water pool. After breakfast the class divided into groups of five each, in charge of an instructor, and set out on the excursion, being directed from place to place by arrow marks. Each group was equipped with cameras, insect nets, killing bottles, specimen boxes and there was always handy a first aid set in case of emergency. On returning from the excursions the boys mounted and classified their specimens, discussed the problems of the day among themselves and, with the instructors, and retired to the tables (erected under tent flys) to record the necessary information and sketch the required diagrams.

After lunch the class saw something of the practical side of a forester's work. An insight was obtained as to the method

of seed propagation, the care adopted in the nursing beds, planting, cleaning, thinning, wrenching, etc. A time was set apart in the afternoon for note-taking on these operations, and when this was completed the boys went off to their recreation. The day's work over, the evening was devoted to "camp-fire tales," song, gramophone entertainment and in briefly outlining the work and problems for the next day.

The work was conducted on similar lines each day. In such manner the week was spent.

Altogether, it can be said the school was a great success. It provided a course of study that was a delight, both to the students and teachers.

Perhaps it failed in imparting dry scientific facts; perhaps it may be faulted for the amount of knowledge it planned to give. But, best of all, it succeeded in the aesthetic, ethical and spiritual aspects of nature study, thus laying the foundations for that character and outlook on life which sees heart to heart with Froebel's thought: "From every part of nature and of man there is a way to God."

PRESENTATION TO MR. A. A. HAMILTON.

About fifty members of the Naturalists' Society assembled at the Wallaroo Cafe on the 14th May to show their appreciation of the services rendered to the Society and science in general by Mr. A. A. Hamilton.

Mr. Hamilton was one of the original members of the Society, and only ceased to take a prominent part in its activities very recently, when an unfortunate affliction caused the almost total loss of his eyesight. He is best known for his botanical work, but has a wide knowledge of natural history subjects. He has been an outstanding figure at the meetings of the Society for many years, and his genial personality is now sadly missed at our meetings. Mr. Hamilton was ever ready to assist fellow members, and his wide knowledge and guiding influence was always at the disposal of every member of the Society. He has been an indefatigable worker, and was also a prominent member of many scientific societies, including the Linnean Society and the Royal Society, and was latterly associated with the Chamber of Agriculture.

During the evening many excellent tributes were paid to the work of Mr. Hamilton, the speakers including Miss Steinbeck, Messrs. W. W. Froggatt, D. G. Stead, E. Cheel, A. G. Hamilton, A. E. Watson, Professor Woolnough and Dr. Mac-kerras.

On behalf of the Society, Dr. Mackerras presented Mr. Hamilton with an electric radiator and electric toaster as a practical expression of appreciation, and Mrs. Hamilton received a posy of Australian native flowers, prepared by Mrs. Howell.

On rising to speak, Mr. Hamilton received a reception which left no doubt as to its warmth. In a characteristic speech he thanked the members for their remarks. "He appreciated that the night, chiefly because it gave him an opportunity to be once again among his friends. He thanked them also for the presentation, and felt that the radiator would radiate the warmth of the friendship of the members." He appealed for greater support for the Society, especially from the younger members.

A number of musical and vocal items were given, and the evening closed with cheers for Mr. and Mrs. Hamilton.

• EXCURSION TO MR. ROYCE'S AQUARIUM, DULWICH HILL.

On Saturday, May 7th, the Naturalists' Society took advantage of the very generous invitation of Mr. Royce, of Dulwich Hill, to visit his aquarium.

That dull afternoon with a tinge of uncertainty in the thin grey clouds produced a "surprise packet" in the best sense of the term. When we passed through the cave-like entrance, by which we approached the back garden, it was as if we all had been switched suddenly into a miniature cave. I almost said Jenolan, but there was too much bountiful life in that frankly appealing grotto to make a fair comparison with the chilly caves of Jenolan—albeit they are beautiful beyond compare. True, there were no stalactites or stalagmites to arrest our attention, but there were roofs, columns and arches in this grotto-like structure that clearly confirmed the resourcefulness, thought, and labour of our kindly host. To think that in six short years a back garden had been converted into a fairyland!

After we had expressed our delight with the unexpectedness of it all, our host prepared to take us to the aquarium. It was intimated that it would be wiser to leave coats and wraps outside, as we would find the temperature discomforting indoors. We did so.

On entering the aquarium we at once had a sense of tropical atmosphere. This wonderfully-fitted room is always kept at a uniform heat, by hot air pipes, as the small inhabitants are indigenous to the Tropics. Various and multi-coloured were these

tiny tropical fish. The *Rasbora* were numerically conspicuous, and attracted our undivided attention. It was very instructive to see and observe these small fish; one species habitually swallowed the young for protection. A swift little speck of life was said to be a specimen of the smallest fish in the world. A small turtle meandered in a cement floor-pond quite unconcerned with the comments of his admirers.

The appearance of the glass-tanks was enhanced by the many and varied aquatic plants, through which the tiny fish glided and swished. Although the waters are kept at a uniform heat of about 78° to 80°, they are not changed, but kept fresh by a small shelled slug that disposes of all refuse.

Leaving the sub-tropical aquarium was like stepping suddenly into another zone, so noticeable was the difference in temperature.

An offer of tea was gratefully accepted.

We were now free to ramble by way of the arches to the enticing bush-houses, where the ferns hung and trailed, and climbed and curved. I was charmed to see *Marchantia* spreading a jade green carpet on the sweet moist loam. The silver fronds of *Adiantums* and *Aspleniums* peeped out among masses of drooping ferns. The garden paths led to the central basin, afloat with myriad pond plants and grasses, which one could hardly overlook when fish of flaming gold were darting flurryingly through the tangled water growth.

Dendrobium speciosum nestled on the ledges and surprised us in all impossible and unlooked-for places. And the many glossy and robust members of the family *Palmae* completed a picture that will live in memory for many happy days to come.

On behalf of the Society, Mr. Watson thanked Mr. Royce for a very pleasant and profitable afternoon.

LUCY A. HEYNER.

OBITUARY.

During the past month the Society has suffered very serious loss by the death of three of its members:—Mr. J. J. Fletcher, M.A., B.Sc., Mr. H. E. Finckh, and Sir Hugh Dixson.

MR. J. J. FLETCHER was one of the most widely known and respected of Australia's biologists. His long association with the Linnean Society brought him into constant touch with men and women following every branch of zoological, botanical and geological study. As a scientific litterateur he was without a compeer, and his helpful advice was sought by all and

sundry of his associates, and was always freely given. Coupled with his profound knowledge was an exquisite charm of manner not often met with and this, with his general helpfulness, greatly endeared him to a constantly passing stream of students of science.

Mr. Fletcher was Secretary of the Linnean Society from 1886 to 1919, and was President of the Society from March, 1919, until March, 1921. He died on 15th May, 1926, at the age of 76.

Notwithstanding his onerous duties, Mr. Fletcher was occasionally to be seen at earlier meetings of the Naturalists' Society, but latterly was precluded by indifferent health. He always took a great interest in the Society, however, and was helpful in many ways. We mourn a dear friend and a great scientist.

MR. H. E. FINCKH was an active member, of many years' standing, of the Naturalists' Society. He was chiefly known to members in his capacity of Honorary Treasurer—a position which he filled most ably for a considerable number of years. But he also filled the position of President one year with credit to himself and the gain of the Society.

Mr. Finckh was an ardent and accomplished aquarium-keeper, and made a close study of the smaller aquatic plant and animal life. The memory of our friend's enthusiasm in this direction, and of his many beautiful and interesting exhibits, will be fresh in the minds of a large number of members—past and present. His home at Mosman was beautified—one might well say, "glorified"—by a large number of beautiful and artistically arranged aquaria, containing a large range of species of fishes and aquatic invertebrates, and many kinds of Australian and exotic aquatic plants.

By Mr. Finckh's death the Naturalists' Society has lost a true friend and strong supporter.

SIR HUGH DIXSON.—Though a member of the Society for many years, Sir Hugh Dixson did not often come into personal contact with other members, though he was an occasional visitor to our meetings. His many business interests engaged the greater part of his time. In his leisure, however, Sir Hugh found very great profit and pleasure in the study of our native plants and flowers—many species of which were cultivated by him in his own beautiful home garden. News of his death came from Colombo on the 13th May.

DAVID G. STEAD.

14th June, 1926.

NOTES BY MEMBERS.

THE WHITE-GUM MOTH.

By L. Gallard.

This moth was bred from a pupa taken from a white gum tree in North Ryde in March, 1924. The wings and colour resemble those of the Australian goat moth *Culama caliginosa*, but the body and antennae more closely resemble those of the family *Zeuzeridae*. The larva is white and round, and also resembles more closely the typical larvae of the *Zeuzeridae*.

In the life-history and habits it seems to fall about midway between the two abovementioned genera. The tiny larva eats its way through the bark, leaving only a very faint evidence of where it entered, and which with time almost disappears.

The main outward evidence is the irregular swellings caused by the thickening of the tissues between the internal wound, and the bark of the tree. The grub continues to eat its way through the internal tissues, making a rather irregular shaped tunnel. In places they eat right through the sap wood to the bark. Where this happens a slight gumming occurs, causing the bark to dry and crack. It is generally through these cracks that the pupa works its way when the adult is ready to emerge.

In this stage they differ from the ordinary *Zeuzera* in that they do not spin a felted tunnel. In some cases the pupa emerges through an old dried hole caused by the larva eating right out to the surface, but in such cases the hole has generally dried over to such an extent, that one would never identify it as a hole through which a moth would be likely to emerge. I bred out five adults, and in each case they emerged through one of these old dry cracks or holes.

ARRANGEMENT OF A POSY.

By M. Howell.

While trying to arrange a Victorian posy of our wild flowers for presentation to Mrs. Hamilton, I was met by difficulties; firstly, in the fact that most of the flowers in bloom in the winter have very prickly leaves, and next that the blossoms grow down and around the stalk of the plant, thereby preventing them being formed into the "heady" bunch needful for a Victorian posy. To me it shows how difficult it is to try and follow the old customs in new countries. Our flowers adapt themselves to our climate, and so a spraying Australian posy would be more suitable and effective than the Victorian arrangement.

The Australian Naturalist

Vol. VI.

OCTOBER, 1926.

Part 3.

THE MOSQUITOES OF THE SYDNEY DISTRICT.

PRESIDENTIAL ADDRESS, by I. M. MACKERRAS,

B.Sc., M.B., Ch.M., Linnean Macleay Fellow in Zoology.

(Published by permission of the Council of the Linnean Society of New South Wales.)

Owing to the proximity of the Sydney district to areas in which mosquito borne diseases are of serious importance, and owing to the fact that the question of control has been exercising the minds of many citizens of Sydney in recent times, it seems desirable that accurate information about the various local species should be more widely available than it is at present. An endeavour has been made in this address to present the important facts in a concise manner and to indicate their relation to the question of control. The conclusions reached are, perhaps, a little heterodox, but, it is believed, are amply justified by the facts.

The area under consideration may be taken as extending from National Park in the south to the Hawkesbury River in the north and westwards as far as the eastern slopes of the Blue Mountains. It includes many different environments, of which the most important from the present point of view are—the Wianamatta shale country with its small forests of straight trees; the healthy flat sandstone tops; the more densely wooded sandstone slopes; the deeply dissected sandstone gullies; rich patches of brush country on the Narrabeen shales; flat, marshy areas of Pleistocene sand; mud flats, usually with mangroves; the sublittoral sandstone region; finally, but not the least important, the habitations of man. Some species range over a considerable variety of environments, others are extremely limited. Some of the types of country are not markedly dissimilar, for example, the Wianamatta forests and the more densely wooded sandstone slopes have sufficient factors in common to share certain species of mosquito. On the other hand, the heath fauna is different from that of the gullies and much

poorer in species. The peculiarities of each species are dealt with below.

Twenty-eight valid species are at present recognised for the Sydney district, a fair share of the 98 recorded for the mainland, plus Tasmania. It is highly probable that a few names still remain to be sunk as varieties, or possibly as synonyms, and there are a few other unidentified species awaiting description. The bulk of the local mosquito fauna, 11 species, are southward extensions of more northern species, while three are southern forms and the remainder either local or widespread. Three species, *Anopheles stigmaticus* Sk., *Rachionotomyia tasmaniensis* Str. and *Culex sitiens* Wied. are recorded for the area for the first time, and one species, *Culex basicinctus* Edw., is new to New South Wales.

NOTES ON SPECIES.

Anopheles annulipes Walker.—An ornate brown species speckled with white. It is widespread in the area throughout the warmer months, but is rarely seen in houses. It is usually present in small numbers in the sandstone gullies, but is most abundant in the low marshy country at Narrabeen. The larvae are found in small swamps, in soakage pools, in small numbers in rock pools, and sometimes in running water; it only breeds in clear, fresh water and prefers situations containing an abundance of green aquatic vegetation. It bites usually at dusk and at night, but occasionally also during the day-time. This species is the presumed transmitter of the sporadic cases of malaria that have occurred in the district.

Anopheles atratipes Skuse.—An uncommon black species. It is found in late spring in well sheltered gullies and the vicinity of creeks running through the Pleistocene sand flats. It is a day biter and appears to be of no sanitary importance.

Anopheles stigmaticus Skuse.—A rare, small brown species which looks, when alive, like a *Culex*. It is only known, so far, in the district from the rich Narrabeen shales at Waterfall in National Park. Larvae have been found in rock holes in creeks.

Megarhinus speciosus Skuse.—A useful species which was recorded from near Sydney by Skuse, but which has not been seen since in the area. A tree hole breeder.

Rachionotomyia atripes Skuse.—Not common in the district. It may be taken biting by day in the more heavily timbered areas on the Wianamatta shale and the sandstone slopes. Principally a tree hole breeder.

Rachionotomyia tasmaniensis Strickland.—An allied but

rarer species which is only known in the area from the Narrabeen series at Waterfall in National Park.

Aedomyia venustipes Skuse.—The type, which was taken in the 'eighties at Elizabeth Bay, remains unique. Larvae, presumably of this species, have since been taken in National Park.

Taeniorhynchus linealis Skuse.—A rare, day biting species which is found in sandstone gullies.

Mucidus alternans Westwood.—A very large species which usually bites in the evening. It may be very plentiful and annoying during the summer anywhere in the vicinity of mud flats. Principally a salt water breeder, this species is commonest in the Hawkesbury River, upper reaches of Middle Harbour and the Parramatta River, and in National Park. The larvae are predators.

Aedes (Ochlerotatus) vittiger Skuse.—A sandstone gully species which is rarely common. Sydney is its southern limit.

Aedes (Ochlerotatus) vandema Strickland.—A spring species which bites by day and is found in the sandstone gullies. A southern form.

Aedes (Ochlerotatus) flavifrons Skuse.—A rare species which has been recorded from the Hawkesbury River.

Aedes (Ochlerotatus) camptorhynchus Thomson.—An uncommon spring species which bites by day in the sandstone heath country. It is a southern form which corresponds in Melbourne in importance to *A. (O.) vigilax* Sk. in Sydney.

Aedes (Ochlerotatus) rubrithorax Macquart.—An uncommon species which has been recorded from Sydney and the Hawkesbury River.

Aedes (Ochlerotatus) vigilax Skuse.—An exceedingly abundant and annoying blackish species with white tarsal bands. It is prevalent throughout the warmer months and bites principally by day, but also continues its operations during the night. It occurs on all types of country and frequently enters houses, but is most abundant and annoying in the garden and in the bush. Its density varies inversely with its distance from mangrove swamps, which appear to be its exclusive breeding ground. It has a wide range of flight. Thus, it is a pest in the Western Suburbs near the Parramatta River, at National Park, and on the Hawkesbury River where it occurs in myriads, but is not seen in great numbers on the heights of Mosman or the North Shore Line. The mangrove swamp appears to be the basic factor in its distribution, and in the question of its control.

Aedes (Finlaya) biocellatus Taylor.—A very rare species described from the Hawkesbury River.

Aedes (Finlaya) notoscriptus Skuse.—A small species which may be confused with *A. (S.) argenteus* Poir., but differs inter alia in possessing a prominent white band on the proboscis. It is common during the summer on all types of country and not infrequently enters houses, but is rarely sufficiently abundant to be a pest. It bites at any time of the day or night and breeds principally in rock holes, but also in any small collection of water, including roof gutters and drains of houses.

Aedes (Finlaya) alboannulatus Macquart.—A widespread species. Larvae are to be found principally in rock pools, but may also occur in swamps or in sub-littoral rock pools; they are more often met with than those of any other species. Though common, this species is hardly ever seen biting except in shady gullies; it is not a pest.

Aedes (Finlaya) occidentalis Skuse (*queenslandis* Str. in Edwards paper).—Similar to the above, of which it is probably only a variety. It is rather less common and the larvae have only been found in rock pools.

Aedes (Finlaya) milsoni Taylor.—Probably also only a variety of *A. (F.) alboannulatus* Macq.; it is relatively rare.

Aedes (Pseudoskusea) concolor Taylor.—A common species which is completely restricted to the sublittoral zone of sandstone. It bites occasionally by day but chiefly at dusk, when the females may be observed feeding on one in numbers while the males hover and dance around in a cloud waiting for them. The larvae are only to be found in the sublittoral rock pools of varying salinity; they are usually the only forms present in this situation, but a few *A. (F.) alboannulatus* Macq. may occasionally also be seen. No explanation is at present available of this interesting strict limitation of both adult and early stages.

Lutzia halifaxii Theobald.—A useful species, since the adults do not suck blood while the larvae devour other mosquito larvae. It is not common in the area, but has been taken on the shale and the sandstone and once in a house.

Culex basicinctus Edwards.—This species has been found once at Muddy Creek in National Park; it has not previously been recorded south of Queensland.

Culex sitiens Wiedemann.—This species has been also taken once in the same locality as the above; Grafton was its previous most southern record.

Culex annulirostris Skuse.—A day biting species which occurs not very commonly in the sandstone gullies. It breeds in any small collection of clear water.

Culex fatigans Wiedemann.—The domestic mosquito par excellence. It is dull brown in color and without ornamentation. It bites only in the dark and is found practically exclusively in or near houses. It may be very numerous and annoying. It breeds in domestic collections of water and has a strong preference for polluted water, tins of liquid manure being among the most favoured situations. In Queensland and the northern rivers of New South Wales this species transmits filariasis. It is the most economically and efficiently controllable of all the species.

Culex cylindricus Theobald.—An uncommon day biting species which has been found in the sandstone gullies on the northern side of the harbour.

Culex fergusonii Taylor.—Also uncommon. It has been taken in the creeks north of the harbour and on the Narrabeen shale at Waterfall in National Park. The larvae of this species and of *C. cylindricus* Theo. are characterised by an exceedingly long and slender siphon.

Note.—*Aedes* (*Stegomyia*) *argenteus* Poiret (= *fasciata* Fabr.) definitely does not occur in the district. Its most southerly limit is Newcastle and, although it must have been introduced many times into Sydney, it has never established itself here and it is probable that it never will. A similar phenomenon is seen at its northern limit in China.

For the identification, synonymy and systematic literature of the species the reader is referred to Edwards' valuable revision of the Australian Culicidae (*Bull. Ent. Res.*, xiv., pt. 4, pp. 351-401). Specimens of all the above species are available for comparison in the Macleay Museum, University of Sydney.

CONTROL.

In considering the possible control of any group, definite and exact information must be available on a number of points before any action can be taken. These are: Firstly, what is the precise extent of the damage caused? Secondly, exactly which species require attention and which do not? Thirdly, a sufficient knowledge of the bionomics of the pest species must be available in order that control work may be carried out efficiently and inexpensively and in order that its probable cost may be accurately estimated. Finally, is the cost of control sufficiently low in proportion to the damage done to justify it being undertaken? In view of statements which have been made from time to time with regard to mosquito control, it is very necessary to examine each of these questions with considerable care.

Three mosquito-borne diseases occur in eastern Australia. Malaria is prevalent in certain districts north of Cairns, while sporadic cases have occurred as far south as Victoria. Filariasis is endemic throughout coastal Queensland and extends into the northern rivers of New South Wales; a single case was recorded from Camden in 1884. Dengue fever follows the distribution of *A. (S.) argenteus* Poir., which is apparently the only vector, and stops short at Newcastle. In northern New South Wales and in Queensland, the reduction of filariasis and dengue by the control of domestic mosquitoes would undoubtedly be both a health and money saving proposition; in certain areas north of Cairns, the institution also of anti-malarial measures may be taken as indicated. In the Sydney district, however, it is quite another matter. Our mosquito-borne disease is limited to malaria, of which only two cases are definitely known to have occurred; at the very highest estimate it cannot be expected to exceed one case in every three or four years. Dengue and filariasis have never occurred here and there are no grounds whatever for the belief that they ever will, although the vector of the latter is present in considerable numbers. Mosquito-borne diseases in this district then can only be considered as negligible from the point of view of the community as a whole. If, despite these facts, any action were contemplated, it would be much cheaper and probably more effective to compensate handsomely the very occasional sufferers from benign tertian malaria than to take action against *Anopheles annulipes* Walk.

There is another point of view to be considered; mosquitoes may be so numerous and annoying as to constitute a serious public nuisance and justify control measures on these grounds alone. This is the only question requiring serious consideration in the Sydney district. There is no doubt that mosquitoes are a source of annoyance, but there is room for considerable differences of opinion as to the amount of annoyance, depending on the susceptibility of the individual and the prevalence of mosquitoes in his own particular area. It is highly necessary to consider whether the "cure" may not be more vexatious than the "disease" and, before anything is done, the cost of abating the nuisance and the inconvenience it will cause should be accurately estimated and the community asked to decide with a full knowledge of the facts whether any action is to be taken or not.

A study of the notes given above indicates clearly that the list of possibly dangerous or pest species is extremely short, the majority not being worth a moment's attention. The opinion

has been expressed already that malaria is so insignificant that the control of *A. annulipes* Walk. need not be contemplated. If, however, it be considered desirable, it should be strictly limited to those isolated areas, Narrabeen for example, where this species is sufficiently common to be a possible source of danger. The two pest species in residential areas are *Culex fatigans* Wied. and *A. (O.) vigilax* Sk.; these far outweigh all others put together in their attentions on man; *A. (F.) notoscriptus* Sk. may be considered as a possible third. In areas where *A. (O.) vigilax* Sk. is prevalent it is distinctly a greater nuisance than *C. fatigans* Wied. and measures against the latter would not afford a great degree of relief. In the bush *A. (O.) vigilax* Sk. again is much the worst species, but *A. (Ps.) concolor* Tayl. may annoy those who visit the rocky foreshores at dusk (the beaches are not badly infested with this species), *M. alternans* Westw. may worry campers on the Hawkesbury, while the Finlayas may occasionally be a slight annoyance, more particularly in the gullies. None of these, however, can be said to justify any great expenditure of energy or money and we may limit our discussion of control methods of *C. fatigans* Wied. and *A. (O.) vigilax* Sk.

Control measures may be directed either against the adults or against the larvae. Against adults the only method of real value is the use of mosquito nets. These give a considerable degree of immunity from *C. fatigans* Wied. and should be in universal use wherever filariasis is endemic. They are inexpensive and have the advantage that each person is responsible for himself alone. Most repellents are inefficient and their use is highly dangerous in filaria infected localities, because they may enable one to get to sleep in comfort while not preventing bites later in the night. The usefulness of these methods in the area under consideration is limited, since probably more annoyance is caused through the attacks of *A. (O.) vigilax* Sk. during the day and from both species before retiring than from *C. fatigans* Wied. later at night.

The first requisite of any anti-larval measures is that they should be strictly limited to, and concentrated on, the important species. From this point of view a tabular statement of the different types of breeding grounds and the species found in them is of considerable interest.

HOUSEHOLD: *C. fatigans*, *A. notoscriptus*.

FRESH WATER ROCK HOLES: *An. stigmaticus*, *An. annulipes* (but rarely in numbers), ? *A. vittiger*, ? *A. vandema*, *A. notoscriptus*, *A. alboannulatus*, *A. occidentalis*, *A. milsoni*, *L. hali-faxii*, *C. annulirostris*, *C. fergusonii*.

SWAMPS AND SOAKINGS: *An. annulipes*, *A. venustipes*, ? *T. linealis*, ? *M. alternans*, *A. alboannulatus* (occasionally), ? *C. basicinctus*, *C. annulirostris*, ? *C. cylindricus*.

RUNNING WATER: *An. annulipes*, *C. basicinctus*.

TREE HOLES: *R. atripes*, ? *R. tasmaniensis*, *M. speciosus*, *A. notoscriptus*.

SUBLITTORAL ROCK POOLS: *A. concolor*, *A. alboannulatus* (occasionally).

SALT MARSHES: *A. vigilax*, *M. alternans*.

It will be apparent that the only breeding grounds worth attention are the household collections (including street drains and other collections of foul water in which *C. fatigans* may breed) and the salt marshes. All other types may for practical purposes be neglected; their treatment would make no perceptible impression on the mosquito nuisance. This is of special interest, since it is the rock pools and swamps which are the most obvious and the most likely to attract attention; further, they are frequently found to swarm with larvae, which, however, on examination are found to be those of unimportant species. The necessity is obvious, not only of determining that larvae are present in a given collection of water, but also of knowing to precisely what species they belong. A very interesting contrast is seen in respect of the relative importance of different types of breeding grounds between the Sydney district and those highly malarious tropical countries from which most of our knowledge of control is derived. Such American States as New Jersey supply practically the only parallel from which we may draw conclusions of much value. A word of warning against the blind acceptance of methods which are useful elsewhere, under totally different conditions, might not be out of place at this point.

Measures against *C. fatigans* Wied., the domestic species, include the removal of all old tins, etc., which may contain water, weekly emptying of all vessels in which water is kept, screening or oiling of all receptacles which cannot be emptied, attention to guttering, drains, etc., and such other procedures as may be indicated in special cases. Attention to polluted water is the prime consideration, other types are of very secondary importance. The co-operation of all the residents of an area is necessary and a central controlling and directing organisation, with trained sanitary inspectors and power to deal with delinquents, is essential. Sufficient money to carry out a campaign and to maintain operations once they have been initiated must be available. As indicated above, the use of nets gives a considerable degree of protection and it is questionable whether

the not inconsiderable trouble and expense of anti-larval work would be justified.

The most satisfactory method of dealing with the salt marsh breeder, *A. (O.) vigilax* Sk. is by reclamation of the mangrove swamp areas, but draining in some cases or systematic oiling at appropriate times are also of value. Any of these methods would cost a very considerable sum of money. The value of the reclaimed land would possibly make the undertaking worth while in such well populated areas as the Parramatta River, but in purely holiday resorts the cost would be prohibitive.

With regard to the very few localities where the treatment of rock pools or swamps may be contemplated, permanent drainage or filling are the only satisfactory methods, temporary or inefficient methods, such as oiling or stocking with fish being of doubtful utility and more expensive in the long run.

Finally, the house fly is a really serious pest and carrier of disease in the Sydney district, and the very definite opinion may be expressed that any money and energy which it is proposed to devote to mosquito control would be far more usefully and effectively employed in its reduction.

SUMMARY AND CONCLUSIONS.

1. A list of the mosquitoes of the Sydney district is given and their prevalence, habits and distribution are indicated.
2. Mosquito-borne disease in the area is practically negligible.
3. The only prevalent pest species are the domestic *Culex fatigans* Wied. and the salt marsh *Aedes (Ochlerotatus) vigilax* Sk.
4. The control of domestic mosquitoes in northern New South Wales and in Queensland would be both a money and health saving proposition.
5. The only method of value against adults in the Sydney district is the use of mosquito nets.
6. It is very doubtful if anti-larval measures are justifiable in the Sydney district owing to their cost and inconvenience to householders. If undertaken, they should be strictly limited to domestic breeders and breeders in salt marshes.
7. Indiscriminate attack is strongly to be condemned and the efficiency and cost of any proposed measures should be accurately estimated before they are undertaken.
8. Caution should be exercised in adopting methods which have been found useful in other parts of the world, where the

conditions and types of breeding grounds requiring attention are quite different.

9. There is no justification for initiating measures against mosquitoes in the Sydney district, while the house fly, which is vastly more important, is allowed to thrive.

THE DEVELOPMENT OF THE FROG FROM THE TADPOLE.

By P. D. F. MURRAY.

These notes are put together to show to members of our Society the great interest of the change of tadpoles into frogs, a process to be seen in the creeks throughout the year. Every schoolboy has kept tadpoles, and probably most have kept them long enough to watch and wonder at this really amazing change.

Let us compare a tadpole with a frog. The former is an aquatic animal with a tail bearing a fin, lacking legs or only having small legs quite useless for progression, breathing in early stages by means of gills, and generally only using its newly developed lungs later on in its life as a tadpole. The tadpole, too, has a long and coiled intestine which can be seen coiled up like a watch spring through its often more or less transparent ventral surface. The frog, on the other hand, has no tail, no gills, breathes by means of lungs, has large and very active legs, spends most of its time on land, and has a relatively much shorter and straighter intestine than the tadpole. No one who did not know a tadpole was the young of a frog would ever imagine that there was any connection between them. He would probably say the tadpole was a fish, which, indeed, it closely resembles, both anatomically and physiologically.

The tadpole, then, contains many tissues which do not exist in the frog, but it also contains, at least in miniature or represented by little rudiments, the tissues and organs of the frog. Now, the problem has confronted men of science, why do these rudiments of frog tissues remain rudimentary for so long and only develop after a certain longer or shorter larval life? The answer of this question is still not completely known, but there can be no doubt that the essential outlines have now been discovered. It is not possible, nor would it be appropriate, to go into the full details of the extended and complicated investigations which have been carried out, but a brief summary of the facts may be presented.

Metamorphosis of a tadpole into a frog depends upon the activity of the thyroid gland. Go into the bush, find some tadpoles, bring them home and place them in water containing, say, one tablet of Burroughs Welcome's thyroid preparation in 1,000 cc. of water. It will be found that, after a few days, the tadpoles will begin to develop legs, their tail fin will vanish, their tails will become shorter and shorter, the shape of the head will change, and ultimately they will turn into frogs, even though the experiment be done long before the normal time for metamorphosis. If the experiment should fail, increase the dose. If the tadpoles all die, decrease it. This experiment is one that can be carried out by any naturalist. If the tablet preparations of thyroid are unavailable, get a fresh thyroid from the butcher and feed it to the tadpoles. It will have the same effect.

The importance of the thyroid for metamorphosis is shown conclusively by experiments, such as the following. If from young tadpoles the thyroid be removed completely, they will not metamorphose, but instead will grow into tadpoles of great size, and will live as tadpoles long after their normal brothers and sisters have transformed into frogs. They, in fact, achieve in a sense the life of which Barrie dreamed in "Peter Pan." They never grow up, until they die of old age. But let these "Peter Pan" tadpoles be treated with thyroid, and very soon the long delayed change begins, and they turn swiftly into frogs.

Not thyroid only can give this remarkable result. If inorganic crystals of iodine be dissolved in water (iodine is soluble in water on boiling) and a little be added to the water in which the tadpoles are kept, the tadpoles will change into frogs. The change is not so rapid as when thyroid is used, but undoubtedly occurs. The explanation is that the secretion manufactured by the thyroid, and which is the real agent of metamorphosis, contains iodine as part of its composition. Supply of an unusual amount of iodine means formation of an unusual amount of this secretion, and hence metamorphosis is more rapid. This also is an experiment easily carried out at home. The exact amount of iodine to be used can only be found by experiment. A saturated solution of iodine should be made, the tadpoles divided into several vessels, and a different number of drops of the iodine be added to each vessel every two or three days. If no results show after a week or two, increase the doses.

Still another substance capable of bringing about metamorphosis is the extract of the pituitary gland, which may be

tested similarly by the use of solutions made from tablet preparations. As a matter of fact, though there is good reason for believing that the solution of this gland can act directly on the tissue in causing metamorphosis, it is probable that its normal function is as a stimulus, a stirrer-up, of the thyroid, so that its main action is probably indirect.

Sometimes tadpoles, which have not been treated abnormally in any way, refuse to metamorphose, at any rate, for long periods beyond the usual. Such tadpoles may live several years before they metamorphose. The reason is that, for some unknown reason, their thyroid has failed to act, and, if they are submitted to thyroid treatment, metamorphosis will proceed forthwith.

In some respects the development goes on independently of metamorphosis and of the thyroid. The testis and ovary, for example, are able to attain to a sort of maturity in tadpoles which, for some reason or other, whether natural or induced by thyroid extirpation, have failed to metamorphose, so that the tadpoles are sexually mature (but not sexually functional).

Certain physiological changes occurring in normal development also proceed independently of metamorphosis. The tadpole has considerable powers of regeneration of lost parts. It can, for example, regenerate its tail if this be cut off. If parts of the small limbs possessed by tadpoles, before metamorphosis begins, be cut off the missing parts will be replaced. They can even replace the lungs if these be removed. The frog, on the other hand, has very little regenerative power. If it loses a limb or any other part, it is, usually at least, lost for good. Now, it is a remarkable fact that tadpoles which have not metamorphosed at the normal time, "Peter Pan" tadpoles, resemble the frog rather than the tadpole in their regenerative power. Removal of half the tail leads to no regeneration—the lost half is never replaced. Why a tadpole at one age should be able to regenerate and later in its life should lose this power is a problem, the solution of which would strike at the very base of the great problem of organic development. When this is known, we shall know something, at long last, about the factors controlling growth and development. The definite and sure discovery of those factors and how they work will be one of the greatest achievements of the human mind, and it is, in addition, very possible that the solution of the cancer problem will only come when this discovery has been made.

BIRDS AT INTER-LAKEN.

By FLORENCE IRBY, Casino, N.S.W.

Taken as a whole, Tasmania is rather disappointing from a bird-lover's point of view; but certain places will always stand out in my memory as favoured haunts of the little feathered creatures.

One of these places is Inter-laken—that wild, fascinating strip of land between the shores of two great lakes: Lake Sorell, of about 12,000 acres, and Lake Crescent, about 4,000 acres in extent. Lake Sorell is said to be about forty-nine miles round. It is a beautiful stretch of water, sometimes as smooth as glass, often taking into its clear depths wonderful opal-like tints, and sometimes turning in a few hours to a dark, heaving mass, foaming, wind-tossed waves.

These lakes are the haunts of large numbers of swans, and many other water-fowl, but unfortunately in the shooting season the birds become so shy that it is not easy to observe them. They remain hidden away in secluded, reedy bays; but their notes sound strangely as they fly overhead at night.

A narrow stream connects the two lakes, and up this the fish come, in the spawning season, to Lake Sorell. A large flock of spurwing plovers were feeding on the banks of this stream. They were so tame that they scarcely troubled to move until we were almost upon them. Then, with shrill cries, they flew a short distance and resumed their feeding.

On the flat ground near Lake Crescent quaint little olive-brown native-hens (*Tribonyx mortieri*) were feeding, but they scarcely waited long enough for anyone to come in sight before they ran to shelter amongst the tall tufts of grass. In vain we crept towards them, hoping to surprise them while they fed. Their sense of sight or hearing must be preternaturally keen, or perhaps the Tasmanian native-hen has discovered the secret of perpetual motion, for, although I saw these little hens in dozens upon many occasions, they were invariably running,—running so swiftly that it almost seemed as though racing must be their most popular pastime.

Flocks of bald coots (*Porphyrio melanotus*) also hurried before us, but they did not trust to their legs only as the native hens did. Many of them took to their wings.

Owing to the long continued dry weather, the water in Lake Crescent was low, and at one end of it the mud had dried, with a most curious teselated effect. Although quite caked and hard above, it must have been soft below, for it quaked in a most unpleasant manner as we walked over it; and, having taken a snap-shot of it, we were glad to make our way back to more solid ground again.

Much of the land at Inter-laken is very rocky, and covered with a stubby undergrowth of pink-berry, bracken, tall, coarse grasses and various small shrubs. The pink-berry was beautiful. The berries were just getting their colour, and varied from white, and palest pink, to almost red. At the point where we came upon the best of them we saw a very large snake. A freezing wind was blowing, the air cut like ice, and the snake was trying to sleep. No N.S.W. snake would have dreamt of wandering about on such a day!

Thick forest prevailed there. The eucalyptus trees seemed very tall, and there were banksia trees everywhere. Numbers of small birds pattered about amongst the undergrowth—blue wrens (*Malurus*), brown-tails (*Acanthiza diemenensis*), and yellow-wings (*Meliornis novae hollandiae*). Some dusky fantails (*Rhipidura diemenensis*) were fluttering in their usual restless manner, stopping their sharp "Twt, twt" every now and again to utter a pretty trilling song.

In the forests there was a most curious growth of lichen and short grey moss over everything. The rugged trunks and branches of the banksias, the fallen boughs of the eucalypts, the stems of the pink-berry bushes, the quaint "dead-wood" fences, the rocks, and in places even the ground were strewn with it, until everything had a curiously old and frosted look. Some of the lichens were very beautiful.

Out in the more open places flame-breasted robins were abundant, often in large flocks. Late one evening we stopped beside a small sandy beach. The lake was strangely still, and the water glowed with soft pink and lilac tints reflected from the sunset hues of the clouds. A flock of gaily-chirruping male flame-breasted robins came down to drink. There must have been between twenty and thirty of them darting into the water for the briefest splash and flying out again—little spots of vivid colour—to settle on the rocks almost at our feet.

With the morning sun bird-calls sounded truly. On a stunted gum-tree a flock of black-headed honey-eaters were feeding, hanging head downwards, searching eagerly amongst the twigs and leaves for insects, uttering their clear staccato notes the while. Along some of the shores were thick growths of a pretty tea-tree and brown scrub-wrens were pottering about under them, searching over the ground for insects. If frightened they sprang in amongst the undergrowth growing at the roots of the tea-trees and by springing from clump to clump were quickly lost to sight. They never seemed to bother about flying, trusting instead to their powers of hiding in the thickets. A great many shrike-thrushes were there and small flocks of green parrots (*Platycercinae flaviventris*) would often be seen feeding quietly on the ground, probably eating the grass-seed. There were a good many rosellas amongst the branches of the

gum-trees and some others that looked like musk lorikeets, but I could not get a good look at them.

Yellow-throated honey-eaters (*Ptilotis flavigularis*) called a soft "Tu tu" amongst the banksias. Their note always reminds me of the call of our own yellow-eared honey-eater (*Ptilotis lewini*) though it is not so drawn out.

Yellow wattle-birds shrieked and screamed over the flower cones in the same trees. With the very first streak of daylight I could hear them. They sounded as though they were always quarrelling violently, and I used to hurry out to wander under the tall banksia trees where they were feeding. As a rule they were very shy and would fly hastily into the topmost branches of the giant eucalyptus trees, but occasionally one bolder, or hungrier than the rest, would remain, hopping from bough to bough, dipping its strong beak into the heart of the cone-like flowers, searching for honey or the tiny insects lurking there. Most striking and unusual birds, their movements are curiously heavy and ungraceful. They look as though their great fan-like tails do not belong to them, but have been fastened on as an afterthought. Later in the day they appeared to grow suspicious, and it was hard to get near them. Even at that hour it was difficult to see one at close quarters, for with their tails out-spread, as though to steer with, they would float from tree to tree, all the while uttering weird, unbird-like shrieks. It is not a pretty simile, but the note of this bird sounds like someone being violently ill; and when a flock of forty or fifty of the birds are uttering these strange sounds they arouse painful reminiscences of stormy trips across Bass Strait.

Out in the more open country odd scarlet-breasted robins were calling their bright "Cherri, cherri, cherri." They did not seem to go about in small flocks as the flame-breasted species did. A pair of dusky robins (*Petroeca vittata*) piped mournfully from amongst some bleached, fallen trees. I have read that this bird has brighter notes, but I have only heard it make use of a loud whistling note, mournful in sound, and seeming as though it came from a great distance. Although much staidier in their ways, these little birds always made me think of our own friendly little Jacky Winters.

Five white-backed magpies were searching diligently over the ground as though fearful they might miss their breakfast, breaking now and again into their warbling song. It may be prejudice, but it seemed to me they never sang with the swelling notes or the ecstatic abandon of our sturdy black-backed variety.

A flock of noisy miners scolded heartily as they assembled on a fence; and a pair of butcher-birds uttered gay notes above them. There were no long silences as in many other places; at

Inter-laken some gay whistle, song, or call was sounding constantly.

And, as evening came, a crow flew, uttering its harsh call, across the lake. In the water was the floating body of a dead swan, killed by some "sportsman," its once proud head low in the water, and beaten by every wave against the rocks. Night falls, piercingly cold. Indoors we cluster round a roaring fire; and over the house, against the dark sky, water-birds slowly fly to their feeding-grounds, with deep-toned, eerie cries.

THE LIFE HISTORY OF THE MOTTLED-GREY CLICK BEETLE.

Alaus prosectus Candz.

By WALTER W. FROGGATT, F.L.S. (Forest Entomologist).

During my studies on forest insects for the last two years my official duties have taken me into the hoop pine (*Araucaria cunninghami*) forests of the Dorrigo plateau.

Among the many active larvae found under the rotting bark on the dead trunks of the felled hoop pines are the savage carab-like larvae of this handsome click beetle. They spend their lives between the thick decaying bark and sap on surface wood, moving about freely and feeding upon other beetle larvae, chiefly longicorn and weevils. They pupate in oval cavities.

On October 23rd, 1925, I collected seven fine specimens of the full-grown larvae from pine logs at Brooklana, and packed each loosely in decayed bark in a tobacco tin. You cannot place two in the same tin as they kill each other.

These were kept under observation, and in November each one had cast a larval skin, but showed no inclination for food, though fresh longicorn larvae were placed in their tins. The only attention given them was to moisten the decayed bark at intervals.

- No. 1. Pupated December 31st, 1925. The perfect beetle emerged on January 13th, 1926.
- No. 2.—Pupated January 9th, 1926. The perfect beetle emerged on January 28th, 1926.
- No. 3.—Pupated January 18th, 1926. The perfect beetle emerged on February 1st, 1926.
- No. 4.—Pupated January 28th, 1926. The perfect beetle emerged on February 11th, 1926.
- No. 5.—Pupated January 20th, 1926. The perfect beetle emerged on February 7th, 1926.
- No. 6.—Pupated February 5th, 1926. The perfect beetle emerged on February 20th, 1926.
- No. 7.—Pupated February 12th, 1926. The perfect beetle emerged on March 2nd, 1926.

Before killing the beetles they should be kept alive for a couple of weeks in a test tube plugged with cotton wool, and then placed in a dry cyanide killing bottle. If killed with chloroform or before they are perfectly dry they turn black and lose all their beautiful colouration.

The Australian Naturalist

Vol. VI.

FEBRUARY, 1927.

Part 4.

OUR 1926 NATURE EXHIBITION.

By DAVID G. STEAD, Honorary Organiser.

Our 1926 Natural History, Wild Flower and Aquarium Exhibition passed off with great eclat. It was held from October 6 to 13, daily from 10 a.m. to 9.30 p.m.

The primary reason for holding these exhibitions during the spring is, of course, to get the fullest advantage from the glorious Sydney wild flower season. In selecting the exact date, however, we are not quite masters of the situation, as we must needs adapt ourselves to the nearest period when the exhibition halls can be made available for our use by the Education authorities. The ideal period would be during the first half of September when a large part of our coastal country is a riot of wild flower glory.

Here it is fitting to interpolate the observation—from one's personal experience—that nowhere in Australia is there to be found such a marvellous variety, if not profusion, of native flowers, as in the "Hawkesbury Sandstone" area, reaching from National Park in the South, to the Gosford district in the North. And strangely enough, this, on the whole, is one of the "hungriest" areas in Australia from the ordinary point of view of agricultural development. There are desert and semi-desert areas in Australia—notably in Western Australia and Northern Territory—in which there is a greater profusion for a short time; but in these the variety of the flora is more restricted. But if we are to maintain even a semblance of our wonderful wild flower heritage for all time, it behoves us all to work unceasingly for the spread of knowledge of the flowers and plants; for with that knowledge comes love and the desire, not merely to protect the flora, but to take every opportunity of adding to Nature's bounty by cultivating the plants in private and public gardens.

It seems advisable to emphasise this point here, because, after all, our exhibition is a purely educational one, conceived and carried out with the basic idea of strongly stimulating that great and true patriotism or love of country, which, above all, emanates from a knowledge of the beauties and wonders of animate Nature.

Notwithstanding the lateness of the season, we were able to turn out a highly creditable showing of over 300 species of local native flowers; and to these were added specimens from many distant parts of New South Wales, as well as some from other States. There were also many species of Australian flowers grown in private gardens—notably those from the garden of Mrs. Eedy, of Vacluse—and these added a human interest, not possessed by the ordinary collections. A fine collection of flannel flowers (*Actinotus*) also grown in a private garden attracted much attention, and an exceptionally large gymea or gigantic lily (*Doryanthes*) was sent in by Mr. A. F. Basset Hull, from his garden at Manly. This was a magnificent bloom, measuring actually 64 inches in complete outer circumference. None of us with considerable experience had ever seen a bush specimen with such a dense head having so many flowers open at the one time.

It was intended to make a still greater feature of the collections grown under cultivation, but a number of would-be exhibitors were precluded from doing so owing to the advanced state of the season. Reviewing the possibilities, one can well foresee the time when we might make an exhibition of flowers, the greater part of which had been grown in this way. When that time arrives, there will not be much need to worry about the future of our flora. As it is, the making of this special feature is undoubtedly helping on the cultivation of our native plants and the consequent preservation of our flora.

The General Section of our exhibition showed considerable improvement on our previous shows, and, on the whole, was indicative of greater personal effort on the part of exhibitors. As in the past, an effort was made to specialise on some particular feature of our very wide studies; and, taking into consideration the recrudescence in interest in our forests and tree life generally, a great display of exhibits cognate to the subject was made. In the space at our disposal here it is not practicable to give much detail as to individual exhibits, but a list of these follows.

Before speaking of the individual sets, however, I feel it necessary to particularly single out the very beautiful Aquariums put in by members of the Aquarium Society of New South

Wales—some of them also members of the Naturalists' Society. The Aquarium Section was the cynosure of all eyes, and visitors found it hard indeed to tear themselves away from the fascinating little worlds within the glass walls.

GENERAL EXHIBITS.

1. Mr. R. Dalrymple Hay, the retiring Forestry Commissioner, arranged a magnificent exhibit, occupying the whole of the eastern end of the main hall, illustrating native timbers in the rough, dressed and finished, seedlings of native trees, photographs of forest scenes, etc.

2. Dr. C. Anderson, Director of the Australian Museum, showed several Natural history groups—notably a fine one illustrating our bird life—and an ethnology section. The bird groups were of special use to illustrate the diversity of the avifauna of even the Sydney district, and indicated to the observer what might be gained by a systematic preservation and encouragement of native bird life in the metropolitan area.

3. Dr. Darnell Smith, Director of the Botanic Gardens, aided by Messrs. Cheel, Blakely and Anderson, had a fine collection of mounted botanical specimens and illustrations; also Australian seedlings in pots. This collection contained some herbarium specimens of great historic interest and value. Dr. Darnell Smith also sent *Howea* palms for decorating the halls.

4. Mr. A. J. Nicholson sent a collection of his quite unique photographic studies of insect life.

5. Mr. H. J. Carter exhibited two cases giving typical beetles, to illustrate the classification of beetles in general—a very helpful thing to the younger students.

6. Mr. D. J. Mares, the State Meteorologist submitted some Australian weather maps—of even greater interest to the naturalist than to the layman.

7. Professor T. Griffith Taylor (through Miss Taylor) lent some useful wall charts relating to the migrations of man and the distribution of racial stocks in Europe; also two relief models—one of Australia and another showing the bed of the south-western Pacific area.

8. Professor Burkitt, of the Anatomy Department of the University of Sydney, had a fine exhibit relating mainly to the evolution of man as a species, and models showing skin, hair and certain skeletal structures.

9. Miss Mary Fuller, one of our "younger set," had quite a unique exhibit in the shape of fantastic bird, pixie, and gnome like creatures made principally from the seed capsules or fruits of some Australian trees and shrubs (*Hakea*, *Calli-*

tris, *Banksia*, *Macrozamia*, etc.). Apart from its unique and interesting character, and the undoubted artistry displayed by Miss Fuller, this exhibit is worthy of very special mention. Undoubtedly in these days much bush and natural history study is induced through the agency of these amusing creations. Among the many visitors who were fascinated by this exhibit, was one of our most distinguished Australian Nature-lovers—Sir William Cullen, Chancellor of Sydney University and late Chief Justice of New South Wales—who declared that these little figures from the bush were both artistic and funny, without having that ugliness which some such things have had in the past.

10. Professor L. A. Cotton (through our accomplished young member, Miss Heather Drummond) sent three large cases of geological specimens and crystals, and interesting photographs of the great active volcano of Kilauea in Hawaii.

11. Mr. G. G. Park exhibited some Australian flower paintings.

12. Mr. H. R. Harrington, of the Sydney Technical College, arranged a fine photomicrographic camera, with examples of his work. The camera was set up in working order and attracted much attention from the young students.

13. Dr. W. E. J. Paradise, as secretary of the recently formed Marine Biological Section of the Royal Zoological Society, arranged a most useful exhibit, illustrative of the various branches of marine biological study in this favored location of ours. The Australian Museum also co-operated in this. The excellent labelling of this exhibit is particularly worthy of attention. Members generally would be well advised to pay more attention to this aspect of the educational side of their work. Even to advanced naturalists it is a great aid to the rapid "assimilation" of a varied collection.

Contiguous to this exhibit the writer showed about 100 photographic illustrations of Australian fishes—principally to illustrate the extent of detail of rays, fins, scales, etc., to be attained to where proper attention was paid to the preliminary "setting up" and preservation of the specimen to be photographed.

14. Mr. E. Breakwell, Principal of the Yanco Agricultural High School, and noted agrostologist, sent a mounted collection of Australian grasses. He also sent a book showing 115 specimens of weeds, grasses, etc., with notes on such, prepared by one of the lads (H. Allez) at the school. This young student shows great promise and is to be congratulated on his work. The book was examined with great interest by many

visitors—especially by teachers and students of the secondary schools.

15. Mr. W. L. Waterhouse had an exhibit illustrating Mendelian inheritance in wheat, peas, etc.

16. Mr. George Hooper, Curator of the Technological Museum, sent a very fine exhibit, illustrating the timbers of many of our native trees; also essential oils and some excellent examples of natural history in applied art.

17. Mr. F. W. Eddes exhibited photos of Australian flowers—quite notable studies.

18. Miss Edith Butler showed four cases of butterflies, beetles, etc.

19. Mr. George Card, Curator of the Mining Museum, came forward, as usual, with a fascinating exhibit illustrative of (a) early man, (b) Australian minerals, and (c) local fossils. Mr. Card's arresting and informative labels have much to do with the attractiveness of his exhibits.

20. Mr. M. Gray showed some beautiful butterflies.

21. Mr. W. B. Gurney, the Government Entomologist and an old member, with the aid of Mr. T. McCarthy (Senior Assistant Entomologist and our hon. secretary) exhibited some fine collections, illustrating some of the outstanding features of economic entomology in Australia.

22. Mrs. Roy Underwood had a beautiful exhibit, illustrating her own unique Janina art—native flowers and plants modelled in a form of cement and painted in realistic and artistic fashion on vases, bowls, etc. With such work Mrs. Underwood is doing much to spread the love of our native flowers.

23. Mr. E. W. Austin, secretary of the Sydney Harbor Trust Commissioners, forwarded for exhibition some sections of wharf piling, illustrating the depredations of marine borers—crustacean and molluscan, principally "Teredo" or "Cobra"—and a large example of a "Teredo" removed from a pile.

24. Our president (Mr. W. W. Froggatt) exhibited an entomological collection, illustrating the work of the forest entomologist, as well as timber borers and other interesting insect exhibits.

25. Mr. L. Gallard showed a number of cases of insects of outstanding interest and a bush first-aid kit, illustrating the many practical uses to which the Stringy-Bark Tree (*Eucalyptus eugenioides*) might be put for first-aid work in the bush. Mr. Gallard gave a number of demonstrations with this kit during the course of the exhibition.

26. Mr. A. Forster once more delighted our members and visitors with his beautiful collection of flower paintings.

27. Mr. George Robertson (Messrs. Angus & Robertson) sent a large number of photographs of Australian birds and their nests, as well as original paintings of birds' eggs, etc., and first-proofs of Nature illustrations from the new Australian Encyclopaedia.

28. The Aquarium Society provided through many of its members a most unique exhibit in the form of a number of beautifully set up aquariums, containing many species of fishes and aquatic plants. The fishes included both Australian and exotic forms and included species from Sumatra and Central America, from Europe and from Asia. Our thanks are specially due to the office-bearers of the Aquarium Society of New South Wales—notably to the hon. secretary, Mr. W. H. Wailes and to Mr. Hayes, who was a very regular attendant, giving much information to our members and to visitors on the technique of aquarium keeping. Mr. Hayes' own artistically and scientifically arranged aquariums (for which he obtained first prize from the Aquarium Society) were also included in the show. Prizes were given by the Aquarium Society for the best exhibits under the following heads: (a) Best Set-up Aquarium, (b) Best Gold Fish, (c) Best Australian Fish, (d) Best Tropical Fish, (e) Tank showing the best construction. Undoubtedly the exhibit has given a considerable fillip to the study of aquatic life and to aquarium keeping. Some of the members are beginning to study the aquatic larvae of insects through the agency of the aquarium.

ATTENDANCE.

Throughout the whole course of the exhibition the attendance was extremely satisfactory. While the numbers attending were on the whole approximately the same as the previous year, the class of visitor was more representative of the whole community—from the highest in station to the lowest. The most pleasing feature was the very large attendance of students of secondary schools and of student teachers. The public interest shown was really so extraordinary that one could well see that were we so fortunate as to possess a permanent staff organisation and regular office we could work up this interest to hitherto undreamed of proportions, and so that our Society would become a "power in the land" in science and education. The public was probably never more ripe for education in Nature study generally than at present; and I suggest that it

would be well for our members to individually recognise the fact.

Many enquiries were made by the public as to the organisation of the Society, meetings, excursions, etc. A large number of these came from young students from whom we may expect to recruit a number of members later on.

LECTURES AND DEMONSTRATIONS.

Addresses or demonstrations were given by members and friends during the currency of the exhibition, on a considerable variety of subjects. Sir William Cullen addressed the deaf and dumb senior children, through their teacher, on "Bush and Tree Life." His remarks were received in a most animated and interested way by the unfortunate (but not unhappy) deaf mutes. Mr. S. A. White, of South Australia, gave an address on "Bird Life," Mr. M. B. Welch on "Timber Trees And Their Uses," Mr. L. Gallard on "Insects and the Uses of Stringy Bark in Bush First Aid," Messrs. Blakely and Anderson, of the Botanic Gardens, on botanical subjects, Mr. H. R. Harrington on the use of the photomicrographic camera, members of the Australian Museum staff on Birds, Mammals and Ethnology. Mr. A. Forster on our "Wild Flowers," Messrs. Hayes, Wailes, Royce and others on the Aquarium, as well as several others.

The writer wishes to apologise to any whose demonstrations he may have overlooked in this record. Though a good deal was done in this direction, it was not nearly possible to satisfy a public "hungry and athirst" for information. The ideal to be aimed at in these exhibitions is to have an expert assistant almost continuously on every section. While we shall probably never be able to do that altogether, then we should get as close to the ideal as possible; and that means that every member must throw in his or her weight to make the thing the living success which it may be.

STAFFING OF EXHIBITION.

My previous sentence naturally brings me to the always burning question of finding a staff for the exhibition running over a period of nine days (including preparation). So far it has never been possible to properly do this, and, notwithstanding the great assistance rendered by some, members generally have not yet learned to translate their interest in our biggest function into real practical help. It is not supposed that many members can sacrifice the whole period or even a large part of it, but it is felt that if members once really sense the good work which these shows do among the populace they will

manage in such a way as shall ensure a complete roster of voluntary staff to cover the whole period.

Among those who rendered much assistance in the flower section I must mention first Mr. A. Forster, and then Miss E. Butler, Mrs. Howell, Miss Grainger, Mrs. Jenkins, Misses K. and W. Stead, Miss R. Thurston, Miss R. Winter, Miss G. Walker-Smith, Miss M. Fuller and the Misses Macauley. These names are not in any particular order. Messrs. Cheel, Anderson and Blakely helped greatly in the determination of native flowers.

WILD FLOWER COLLECTIONS.

Collections were contributed to by a number of members and friends. The bulk of the collections came from the neighbourhood of Sydney, but very considerable quantities came from far afield. Flowers were forwarded by the following:—Miss Fletcher, Public School, Chatswood; Miss E. M. Parsons, Cundletown; Miss E. Stephen, Stoney Cross, Leura; Miss Grace Hull, Mangrove Mountain, via Gosford; Mr. Charles Hall, Miller Street, North Sydney; Mr. Grainger, Penshurst; Rev. H. M. R. Rupp, Paterson; Mr. Charles Dick, Port Macquarie, and Mr. M. Steinbeck, Turramurra. Useful collections were also sent by the Queensland Naturalists' Society, the Field Naturalists' Society of Victoria, and by the Field Naturalists' section of the Royal Society of South Australia. In all cases variety of species was aimed at rather than large collections of one kind. The aim of this Society is to build up our flora and not to be an agent for destruction.

GENERAL ACKNOWLEDGMENTS.

Our thanks are specially due to the press for the useful publicity given, which has been a great aid to us in making our work known to the public. When communicated with, and on their own initiative, the daily and weekly papers rendered much assistance. In addition to many paragraphs referring to the exhibition, or to special features, a number of photo illustrations appeared—notably in the *Sydney Mail*, which gave a number of very beautiful reproductions of flowers shown in the exhibition. Such publicity means that our "message" goes out to an extremely large circle in Australia.

We are indebted to the Teachers' Federation Horticultural Society and to the Horticultural Society of New South Wales for the loan of vases and jars for the flower collections.

Our special thanks are due to the Minister for Education, and to the Director of Education, for their kindness in mak-

ing the exhibition halls freely available for our use, and to Mr. Ernest Williams, of the Education Department, for much help in smoothing out many difficulties associated with the preparation and conduct of our show.

GREENHOOD ORCHIDS OF THE PATERSON DISTRICT.

By REV. H. M. R. RUPP, Paterson.

The following Notes may be regarded as an attempt to stimulate keener interest in the study of a fascinating group of our native Orchids—the *Pterostyles* or “Greenhoods”—on the part of members of the Society, and perhaps (through their influence) of nature-lovers in general. Much has yet to be learnt about the relations between the various species, their habits, distribution, etc. Personally, I have very little doubt that in New South Wales there are still unknown species of *Pterostylis* awaiting discovery. In recent years field naturalists in Victoria have added several species to the census for that State, at least three of them—*P. Toveyana* Ewart, *P. decurva* Rogers, and *P. pusilla* Rogers—being new to science. In “The Victorian Naturalist” for July and August, 1926, Mr. W. H. Nicholls gives a most valuable survey, illustrated by outline figures, of the Victorian “Greenhoods.”

The time is perhaps scarcely ripe for a similar survey of the New South Wales species, but as a step in that direction I have asked Mr. A. Forster to co-operate with me in laying before the Naturalists’ Society an illustrated paper on the “Greenhoods” of one particular locality—the Paterson district. Mr. Forster will present each species as it appears in the living state, while I shall endeavour to provide notes which are the result of observations made by myself or by others from whom I have obtained information. In the proceedings of the Linnean Society of N.S.W., Vol. 1, Part 3, 1925, and Vol. II., Part 2, 1926, will be found notes on practically all the Australian “Greenhoods” in my herbarium; the present notes may be considered as amplifying and supplementing these in regard to the twelve species now dealt with.

The “Greenhood” Orchids of Paterson which I have collected during a residence of nearly two years are the following:—*Pterostylis ophioglossa* R.Br., *P. concinna* R.Br., *P. acuminata* R.Br., *P. curta* R.Br., *P. nutans* R.Br., *P. pedunculata* R.Br., *P. truncata* Fitzg., *P. reflexa* R.Br., *P. revoluta* R.Br..

P. obtusa R.Br., *P. mutica* R.Br., and *P. longifolia* R.Br. It is quite possible that other species await discovery in the district. I expected to find *P. Baptistii* Fitzg. and *P. grandiflora* R.Br., but diligent search has so far failed to locate either.

1. *P. OPHIOGLOSSA*, R.Br. In June, 1925, high up in a rocky gully on Hungry Mountain, just across the Paterson River from the township, I found a dainty *Pterostylis* with almost crimson galea and striae, which at first I thought to be a new species. It appears, however, to be undoubtedly a form of *P. ophioglossa*, having the general form of that flower and the characteristic forked labellum. It occurred to me as possible that hybridisation had taken place between the typical form and *P. pedunculata* R.Br.; but this red form seems constant on high rocky hillsides throughout the district. The flower is smaller than in the type, the galea more abruptly terminating, and the antennae are shorter. The typical green *P. ophioglossa* is not uncommon in open forests on the lower slopes of the hills. A third form occurs somewhat scantily on open pastures, with a stem only about one inch high, and a flower more nearly white than any other *Pterostylis* I have seen. It is possible that this may be merely the type-form dwarfed and bleached through the removal of the sheltering scrub which once covered these pasture-lands.

I have ventured to suggest that the origin of *P. ophioglossa* may possibly be traced to a union of *P. concinna* R.Br. with *P. truncata* Fitzg. In foliage and in habit it closely resembles the former: in the typical form the flower-markings are very similar: while the finely-pronged fork of the labellum might be expected from a combination of *P. concinna* with some species possessing an entire but slender acuminate labellum. The general form of the flower, and in particular the abruptly truncate petals, strongly suggest such species to be *P. truncata*. (All three species occur near Paterson, but while *P. ophioglossa* and *P. concinna* may flower contemporarily, *P. truncata* is much earlier). The fact that *P. ophioglossa* is found in New Caledonia, while *P. truncata* is unknown there, may be quoted against this hypothesis; but what we may call "circumstantial evidence" points towards it.

2. *P. CONCINNA*, R.Br. Few "Greenhoods" which have come under my notice vary so little in form as this widely-distributed species. It is so well known that it calls for very brief comment. It is apparently rare in the Paterson district. In 1925 my son and I found a small colony in a *Melaleuca* scrub beside the Paterson-Vacy road; and in 1926 I dug up a bud-

ding plant, which I took for a young *P. ophioglossa*, near Martin's Creek. It duly developed its flower—a typical *P. concinna*. The interesting allied species of Victoria and Tasmania, *P. Toveyana* Ewart, should be looked for in N.S.W. localities where *P. concinna* and *P. alata* Lindl. are associated, these two being “suspected” as its original parents.

3. *P. CURTA*, R.Br. Very common amongst the hills on both sides of the Paterson Valley. In my Linnean Society papers referred to above, I have remarked on variations in this species. Mr. W. H. Nicholls mentions the pale colour of *P. curta*, but my experience is that as a rule only the smaller-flowered forms are pale. In the larger forms I have usually found the anterior portion of the hood decidedly brownish. It would be interesting to know what purpose is served by the curious and characteristic twist in the labellum of this orchid. Mr. Nicholls (*Vic. Naturalist*, July, 1926) calls attention to a similar but less pronounced habit in *P. truncata* Fitzg.

4. *P. ACUMINATA*, R.Br. I was unaware of the presence of this species in the Paterson district until May, 1926, when I found it in great abundance in a *Melaleuca* scrub between Paterson and Martin's Creek. Subsequent search in the similar scrub by the Vacy Road was rewarded with success, though it is not common there. I have dealt in the Linnean Society papers with the question of the occurrence of *P. acuminata* in Victoria as a springtime orchid. I may add here that Mr. W. H. Nicholls has fully convinced me that it does so occur, though the robustness and very “leafy” development of one Victorian form suggests to me hybridisation with some member of the group to which *P. cucullata*, R.Br. belongs. In June, 1926, I dug up a young budding plant of doubtful identity near Martin's Creek. It flowered in July, and proved to be *P. acuminata*, though the “main crop” of that species had disappeared. It differed from the typical form in the unusually decurved galea, in the sharply reflexed lateral sepals, and in the remarkably hooked points of these segments. *P. acuminata* seems to me very closely allied indeed to *P. Baptistii* Fitzg. In form it is often extraordinarily like a very diminutive specimen of the latter, which in my experience is seldom coloured so deeply as Fitzgerald represents it, and frequently has the leaves restricted to a basal rosette.

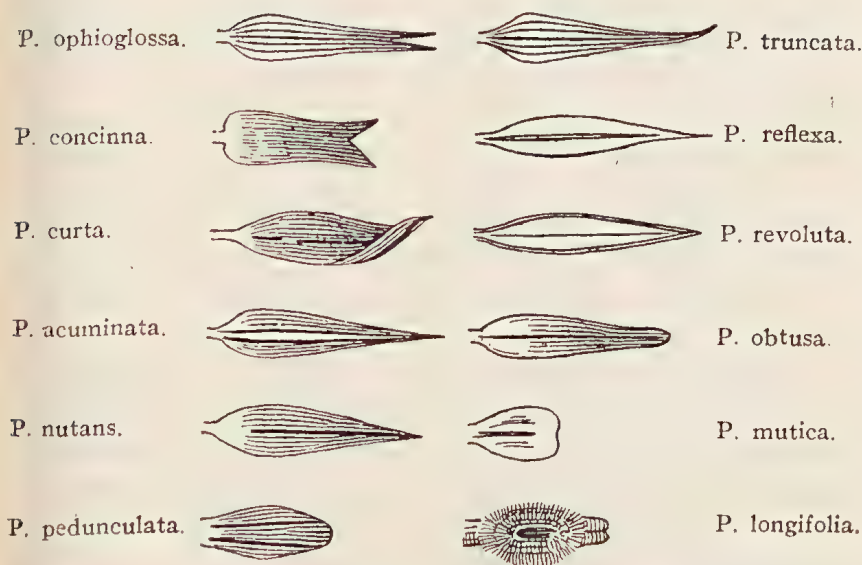
5. *P. NUTANS*, R.Br. Like *P. concinna*, the “Parrot's Beak” is too well known to call for much comment. It is abundant in the Paterson district, flowering from June to well on in September. It is not subject to much variation here,

but teratological specimens are more frequent than in other species.

6. *P. PEDUNCULATA*, R.Br. Fairly common in sheltered gullies. In the Linnean papers I have recorded two forms. Only the tall form with a flower smaller and much darker than the type, seems to occur about Paterson.

7. *P. TRUNCATA*, Fitzg. I have previously recorded this only from the Nandewar range, to the west of Barraba; and in my second Linnean paper mentioned its discovery in Victoria in 1924 by Mr. W. H. Nicholls. Mr. Nicholls subsequently found it on the Keilor Plains, close to the Melbourne suburban area, and sent specimens to me from there in April, 1926. A week or two later, I came across a large colony, in full bloom, in the churchyard at Martin's Creek, near Paterson. Some of the flowers were very large. The galea of this species, both in the N.S.W. and the Victorian forms, is not consistently blunt, but is occasionally quite acuminate. The petals, however, are always bluntly truncate; and like those of *P. ophioglossa* they form a very prominent feature of the flower. *P. truncata* is a very attractive and interesting species. It differs, I think, from all other *Pterostyles* in the great size of the flower in proportion to the short stem.

8. *P. REFLEXA*, R.Br. Fitzgerald describes (Vol. i., Part 5) and figures two forms under this name, calling them A. and B. His B. is undoubtedly, as he suggests, Brown's *P. revoluta*, and it seems advisable to keep the two forms separate. They can hardly be termed identical in structure, and in my experience their habits differ. Fitzgerald quotes Mr. A. G. Hamilton as finding it difficult to believe them the same species, and I confess that I, too, find it difficult. My former Notes on *P. reflexa*, however, were based on the assumption that the orchid so called in Victoria and South Australia was correctly named, and this seemed to me to imply that neither of Fitzgerald's forms was the true *P. reflexa*. In April, 1926, however, I found both forms on the Paterson hills. About *P. revoluta* there was little difficulty: but I wondered how Fitzgerald could have made a mistake about the other—and if it was not *P. reflexa*, what was it? I sent specimens to Dr. Rogers and Mr. Nicholls, asking them to review the matter. Dr. Rogers replied that after comparing the Paterson orchid with Fitzgerald's A., and with actual specimens collected by Brown near Port Jackson in 1804, he was satisfied that it was the true *P. reflexa*. Mr. Nicholls concurred. The southern plant known as *P. reflexa* must therefore be removed elsewhere. As a mat-



GREENHOOD ORCHIDS OF PATERSON.

Labella (enlarged and front view).

ter of fact, Prof. Ewart and Mr. Sharman did remove it, in 1915, calling it *P. praecox* (*alata*) var. *robusta*. Until a further revision may be made, this name should stand.

9. *P. REVOLUTA*, R.Br. This form occurs chiefly in comparatively dry soil on ridges, whereas—as far as my observations go—*P. reflexa* may be looked for in the moist mosses covering surface-outcrops of rock. The flower of *P. revoluta* is usually rather more than twice as large as that of *P. reflexa*, and the curve of the outline is less pronounced. The labellum is shorter in proportion, and is also less strikingly curved.

10. *P. OBTUSA*, R.Br. Not uncommon in stony gullies fairly high up on the hills. The Paterson form seems to me a more vivid green than usual, and is very attractive. Opposite the uppermost stem-leaf there is frequently a filament-like process, which I take to be either an attempt to produce a second flower, or the rudiment of a lost one. In several cases a partly-developed bud is quite distinct. As a curious incident, I may relate that in May, 1926, I dug up five young plants which were growing close together. Three of these I sent to Mr. Nicholls in Melbourne: the other two I planted myself. Both

developed extraordinarily abnormal flowers, in which it was difficult to "place" the various parts. Mr. Nicholls reported precisely the same experience with his three. Other young plants developed quite normally.

11. *P. MUTICA*, R.Br. The Paterson form of this species is by far the largest I have seen, attaining a height of more than 12 inches, with as many as 18 flowers. It is abundant in lightly-timbered country beyond Tocal, on the Maitland Road.

12. *P. LONGIFOLIA*, R.Br. Until recently I had only recorded a single withered specimen in the district, on Dunn's Creek. I found it in July, 1926, in the *Melaleuca* scrub near the Vacy Road, but it is not plentiful.

Since the above Notes were read before the Society, a schoolboy has brought me a single very beautiful specimen belonging to the group of Pterostyles which includes *P. rufa*, *P. squamata*, *P. Mitchellii*, and *P. pusilla*. I have made careful sketches for purposes of comparison, but, though I am unable as yet to state the identity of this plant, it certainly adds another species to the record of Paterson "Greenhoods."

NOTES BY MEMBERS.

A VISIT TO BELLATA.

By P. E. B. Barnett.

During a recent trip to Bellata, 382 miles north-west from Sydney, we camped at "Dow's Well," seven miles from the town on the eastern side of the railway line. During lunch a casual glance round, in an area not greater than our meeting-room disclosed, among others, the following plants to which popular names have been applied.

Dock, variegated thistles, stinging nettles (edible), crow's foot, milk thistles, wild turnip, horehound, "lamb's tongues," darling pea, Bathurst burr, black thistle (the roots of which at a certain stage are used in connection with rabbit poisoning), prairie grass, dot, wild tobacco, marshmallows, wild mustard, wild spinach (said to be not unlike the ordinary spinach to eat), and "nardoo."

Several of the above are said to be good substitutes for garden plants of the same name. The whole were in a very shallow depression, extending over almost level country and only carrying water during storms.

During the same visit I collected the bulbs of *Crinum flaccidum*, known in all the localities in which it occurs by such local names as the "Bogan Lily," "Darling Lily," etc.

The bulbs were collected 17 miles from Bellata, on a rough rocky hill about 1,600 feet high, which is the highest altitude I have found them. They bloom from about Christmas time until towards the end of January. This bloom is followed by a second crop of blooms about Easter. They are usually white in colour, but in many localities have a lovely pink tinge.

AN EXCURSION TO LANE COVE.

By M. Howell and B. Bertram.

This excursion was arranged to give members an opportunity of seeing some cultivated native plants and also to explore Parklands Gully, a natural reserve controlled by the local municipal council. Members journeyed to Lane Cove by tram, via McMahon's Point, and were met by the writers who were the leaders of the excursion. The first place visited was the home of Mr. Campbell, in Lane Cove Road, where some very fine waratah bushes were seen. On one of these 40 blooms were counted. The site is located on the side of a ridge where the plants get the full force of the south-westerly and most adverse wind in this locality. Yet the plants are doing well.

We next called at the residence of Mrs. Howell, where we saw 18 species of our native flora, including flowering plants and shrubs. Included among these were five species of *Acacias*, one fine species of which was brought from Port Stephens some 10 years ago, and is now a very fine shade tree, about 15 feet high.

We next visited Parklands Gully, where a number of saw-fly larvae were the first specimens taken. They were apparently those of the steel-blue saw-fly *Perga dorsalis*. A nest of the golden bodied wood-ant *Polyrhachis ammon* with its main entrance in the top of an old tree stump which was level with the ground. On the wattle trees numerous galls were found, all of which have proved on former excursions to contain the larvae of small wasps, chiefly Braconids. Pond life was not plentiful, owing to the muddy condition of the water in the creek, due to recent rains, but a few "skaters" (*Hydrometridae*) were noticed skimming along the surface of the water. Being winter, insect life was rarer, and thorough searching was necessary to locate them in their winter quarters. Under the bark of the gum trees we found several beetles, mostly belonging to the family Tenebrionidae, some short-horned grasshoppers and a long-horned grasshopper that made a rasping noise with the wing and the hind leg. A small scorpion was discovered, as usual under bark, and also some reddish brown

and black beetles very like leaf-eating beetles (*Chrysomelidae*) in shape. Under some bags on the ground a few cockroaches, both nymphs and adults, were found. They were of the common bush type. An old nest of the bag-shelter moth (*Teara contraria*) was found at the foot of a small shrub, together with several cases of a case moth and an empty cocoon of a cup moth.

On Dalton's Estate a nest of the common ant *Camponotus intrepidus* was discovered. This ant, because of the similarity of its nest and its habits, is often mistaken for the true "bull dog" ants (*Myrmecia*). It does not sting, however, but has very powerful mandibles, and when handled quickly get a grip which, in proportion to their size, is really formidable. One specimen, on this occasion, managed to get some poison into a small cut on the hand of one of the collectors. The irritation produced was not unlike spirits of salts and lasted for two or three hours. Several nests of the small black ant were broken into in search of the larvae of a Syrphid fly (*Microdon*), which lives with the ants to their mutual benefit. One collector has found the old pupal shells in this district, but they are not plentiful anywhere and on this occasion no specimens were obtained. Although a large collection was not made, the afternoon still proved of interest: at any rate, to most of the younger members, who were anxious to learn about the common local insects, and this interest, if kept alive by practical application and tuition, will, no doubt, lead to higher and useful fields in the science of Entomology.

Quite a number of different kinds of ferns were noticed and a wealth of vines with flowers and fruit, the latter making a pretty collection, being blue, yellow, green, red, white and purple. By the gully's edge not far above the creek, Mr. Foster found a couple of green orchids amongst the ferns and maiden hair.

Walking along to Dalton's Estate, out again on the open wind-swept heights which overlook the valley of the Upper Lane Cove and its tributaries, we found the following botanical specimens:—Orchids (yellow, mauve, white and green, sundews (*Drosera pygmaea*) with their tiny insect victims on their sticky leaves, spider flower (*Grevillea*) two species (red and cerise), false sarsparilla (*Hardenbergia*) pea flower (*Dillwynia*), *Acacia longifolia*, *Banksia ericifolia*, native currant (*Leptomeria acida*), *Tetratheca thymifolia*, needle wood (*Hakea*), honey flower (*Lambertia formosa*), blueberry ash (*Elaeocarpus cyaneus*), little flannel flower (*Actinotus minor*), bread and meat plant (*Darwinia fascicularis*), *Clematis*, *Smilax* and many other vines were noticed.

Vol VI Parts 5, 6, 7, 8 ?

— never published. see T. P.

